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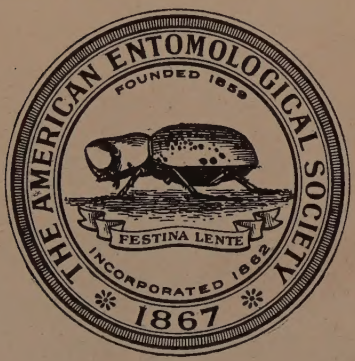

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LIST OF PAPERS

CRESSON (EZRA T., JR.)
A Systematic Annotated Arrangement of the Genera and Species of the Neotropical Ephydridae (Diptera). II. The Subfamily Notiphilinae 35
(Issued May 22, 1947)

CRESSON (EZRA T., JR.)
A Systematic Annotated Arrangement of the Genera and Species of the Ethiopian Ephydridae (Diptera). II. The Subfamily Notiphilinae 105
(Issued September 16, 1947)

DARLINGTON (EMLEN P.)
Notes on Certain Types of Lepidoptera Described by Brackenridge Clemens 85
(Issued July 16, 1947)

DILLON (LAWRENCE S.) AND DILLON (ELIZABETH S.)
The Tribe Dorcaschematini (Coleoptera: Cerambycidae) 173
(Issued January 9, 1948)

GREEN (JOHN WAGENER)
New Eastern American Species of Podabrus (Coleoptera: Cantharidae) 63
(Issued July 16, 1947)

NEEDHAM (JAMES G.)
Studies on the North American Species of the Genus Gomphus (Odonata) 307
(Issued January 9, 1948)

PATE (V. S. L.)
The Pemphilidine Wasps of the Caribbees (Hymenoptera: Sphecidae) 1
(Issued April 18, 1947)

ROBINSON (MARK)
Two New Species of Scarabaeidae (Coleoptera) 169
(Issued October 24, 1947)

ROBINSON (MARK)
A Review of the Genus Phanaeus Inhabiting the United States (Scarabaeidae: Coleoptera) 299
(Issued January 9, 1948)

ROSS (HERBERT H.)
Descriptions and Records of North American Trichoptera, with Synoptic Notes 125
(Issued September 16, 1947)

WILLIAMS (JOSEPH L.)
The Anatomy of the Internal Genitalia of Fumea Casta Pallas (Lepidoptera: Psychidae) 77
(Issued July 16, 1947)

TRANSACTIONS

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AMERICAN ENTOMOLOGICAL SOCIETY

VOLUME LXXIII

THE PEMPHILIDINE WASPS OF THE CARIBBEES
(HYMENOPTERA: SPHECIDAE)

BY V. S. L. PATE

Research Associate, The Academy of Natural Sciences of Philadelphia

(Plate I and text-figure)

Le Peletier de St. Fargeau and Brullé in their *Monographie du genre Crabro,*[1] published in 1835, described the first Antillean pemphilid wasp, *Solenius craesus,* from Cuba. Thirty years later, E. T. Cresson published his classic treatise *On the Hymenoptera of Cuba*[2] and added three species to the roster of Antillean forms. Then in 1881 Dewitz presented a diagnosis of the Puerto Rican *Crabro Mayeri.*[3] Finally in 1941, I characterized the peculiar endemic Cuban form, *Ectemnius* (*Merospis*) *cyanauges.*[4] In the period between 1880 and 1940, several faunal lists of the insects, either of the Antilles as a whole or of various individual islands, have been published,[5] but it is very evident that many species of

[1] Ann. Soc. Ent. France, III, pp. 683–810, (1835).
[2] Proc. Ent. Soc. Philadelphia, IV, pp. 1–200, (1865).
[3] Berlin. Ent. Zeitschr., XXV, pp. 198–208, (1881).
[4] Ent. News, LII, pp. 121–125, (1941).
[5] ASHMEAD, W. H. Report on the Aculeate Hymenoptera of the Islands of St. Vincent and Grenada, . . . and a List of the described Hymenoptera of the West Indies. *Trans. Ent. Soc. London,* pp. 207–367, (1900).
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WOLCOTT, G. N. Insectae Portoricensis. *Journ. Dept. Agr. Porto Rico,* VII, pp. 1–312, (1923).
Insectae Borinquenses. *Journ. Agr. Univ. Puerto Rico,* XX, pp. 1–627, (1936).

the early authors are poorly known and often misunderstood. This has prompted me to tender the present survey of the pemphilidine wasps of the Caribbees.

This review is based upon the material in the collection of the Academy of Natural Sciences of Philadelphia. Dr. Joseph Bequaert of the Museum of Comparative Zoölogy at Harvard College, Dr. E. A. Chapin of the United States National Museum, and Mr. Herbert F. Schwarz of the American Museum of Natural History have graciously permitted me access to the collections in their charge, and to each of these gentlemen I wish to express here my sincere thanks for their kindness and courtesy.

Pemphilidine Fauna of the Caribbees

Ten species of pemphilidine wasps, distributed among three genera, are now known from the Antilles and Bahama Islands. Most of these are found on the Greater Antilles: no pemphilids are known to occur on any of the Lesser Antilles save in Grenada, southernmost of the Windward Islands.

The Bahama Islands harbour two species: *Ectemnius craesus* and *E. auriceps,* which probably reached these islands from Cuba where both are common and wide spread.

Representatives of all three genera occurring in the Antilles are found on Cuba, largest of the Greater Antilles. *Euplilis* and *Lestica* have but one Cuban species: *Euplilis claviventris* and *Lestica cubensis,* both of which are limited to this island, whereas *Ectemnius* has four representatives: three of these—*continuus, craesus,* and *auriceps*—are members of the cosmopolitan subgenus *Hypocrabro,* while the fourth—*cyanauges*—is the type of the peculiar subgenus *Merospis.* The last species is found only in Cuba; *auriceps* is mainly Cuban but also occurs on Cat Island in the Bahamas; *craesus* is a wide-ranging Caribbean form which is found on all the Greater Antilles; while *continuus* is an ubiquitous Holarctic species which may be regarded as adventive in the Caribbees.

Jamaica has only two species: *Ectemnius dizoster* and *E. craesus,* both of which are referable to the subgenus *Hypocrabro.* The first is an endemic Jamaican form confined to this island, whereas the latter is also found on all the other Greater Antilles.

Hispaniola, likewise known as Santo Domingo or Haiti, is the second largest of the Antilles but only two species are known from it at present: the precinctive *Ectemnius taino* and the common and widespread *E. craesus*. Undoubtedly more species will eventually be recorded from this island when the wasp fauna is more fully investigated and known.

Only one species, *Ectemnius craesus,* known also from all the major Greater Antilles as well as the Bahamas, has been taken on the small island of Mona which lies midway between Hispaniola and Puerto Rico.

Puerto Rico, smallest of the Greater Antilles, has but two species: the endemic form *Ectemnius mayeri,* and *E. craesus,* also known from all the other islands to the west.

From all the Lesser Antilles, which stretch in a great five hundred mile arc from the eastern tip of Puerto Rico almost to Trinidad opposite the South American mainland, no species of this group have ever been reported or are yet available save from Grenada, southernmost of the Windwards. This island harbours a single species, *Euplilis grenadinus,* described on a following page.

Trinidad, and its dependency Tobago, are not considered here part of the Caribbees. The pemphilidine fauna of Trinidad is still very imperfectly known, but inasmuch as the island is merely a detached bit of the mainland, it probably has little in common with the Antilles proper. In 1941, I described *Crossocerus* (*Blepharipus*) *callani* from Trinidad.[6]

The most outstanding characteristic of the Antillean pemphilid fauna is its poverty: this is true not only of the archipelago as a whole but of many of the various individual islands as well. At the present juncture, however, it might be well to interpret this as an apparent rather than an absolute condition. For I believe that our knowledge of the distribution of these small wasps in the Antilles is still very imperfect and far from complete. Hispaniola certainly harbours as many, if not more, species than Cuba from which we now know six forms. Future investigations in this island and particularly throughout the Lesser Antilles will probably reveal either the presence of additional unknown species or extend considerably the range of some of those already described.

[6] Notulae Naturae (Acad. Nat. Sci. Philadelphia), no. 91, p. 5, (1941).

Another striking feature of the Antillean pemphilidine fauna is the failure of the populations of those few species which occur on more than one island to form separate insular races.

The Antilles possess representatives of three cosmopolitan pemphilidine genera: *Euplilis, Ectemnius,* and *Lestica.* With the exception of the adventive Holarctic ubiquist, *Ectemnius continuus,* all of the presently known species are endemic West Indian forms. Most, if not all, of them are derivatives of the Neogaeic fauna. The monotypic subgenus *Merospis* and the *auriceps* complex of *Ectemnius* are the most distinctive precinctives in the Caribbees: they undoubtedly are quite ancient and probably represent the primeval pemphilid autochthons in the Antilles, whereas *Ectemnius croesus, E. dizoster,* and *Euplilis claviventris* may be considered representatives of a much later wave of immigrants. The last incursive element in the islands is indubitably *Euplilis grenadinus,* which is very closely related to, but quite distinct from, the western Costa Rican form, *Euplilis calverti.*

Systematic Treatment

The following key will serve to differentiate the three genera known to occur at present in the Antilles. It is not unlikely, however, that species referable to other genera may eventually be found on some of the islands, and in such case the key given in my recent conspectus of the pemphilidine wasps [7] may be consulted.

Key to the Antillean Genera

1. Abdomen petiolate, the first segment very slender and elongate; mesopleura with prepectus rounded anteriorly; maxillary palpi five-segmented, labial palpi three-segmented.....**Euplilis** Risso

   Abdomen sessile or at most subpetiolate, the first segment never very slender and elongate; mesopleura with prepectus margined and sharply carinate anteriorly; maxillary palpi six-segmented, labial palpi four-segmented.....2

2. Vertex with supra-orbital foveae distinct and well developed; mesopleura with very coarse, well-separated alveolate punctures; males without an apical calcar on middle tibiae.....**Lestica** Billberg

   Vertex with supra-orbital fovae absent or very indistinct; mesopleura not coarsely punctate, generally horizontally striate, costulate or rugose; males generally with an apical calcar on middle tibiae.
   Ectemnius Dahlbom

[7] Amer. Midl. Nat., xxxi, pp. 329–384, (1944).

EUPLILIS Risso

Two species of this cosmopolitan genus occur in the Antilles, one in Cuba and Jamaica, the other on Grenada. Both are members of the nominate subgenus. Ashmead referred *Crabro auriceps* Cresson to this genus, but that Cuban species is an *Ectemnius* of the large and diversified subgenus *Hypocrabro.*

Although nothing is known about the biology of the Antillean *Euplilis,* these species, like their Holarctic congeners, are probably xyloecetes, nesting in hollow or pithy stems or utilizing the abandoned burrows of wood-boring beetles. Their nests are probably provisioned with small Diptera, psocids, or aphids.

Euplilis (Euplilis) claviventris (Cresson) (Plate I, figs. 15, 23.)

Crabro [*Rhopalum*] *claviventris* Cresson, Proc. Entom. Soc. Philadelphia, IV, p. 151, (1865); [♂; Cuba].—Packard, Proc. Entom. Soc. Philadelphia, VI, p. 383, (1867).

Crabro claviventris Gundlach, Contrib. Entom. Cubana, II, p. 140, (1886); [♂; Cuba: "a specimen from Sr. Poey without definite locality"].—Dalla Torre, Catal. Hymen., VIII, p. 590, (1897); [♂; Cuba].—Cresson, Mem. Amer. Ent. Soc. no. 1, p. 102, (1916); [♂; Cuba].—Gowdey, Jamaica Dept. Agr. Ent. Bull. no. 4, p. 97, (1926); [Jamaica].

The more robust body, opaque habitus, bright yellow clypeus, very strongly swollen hind tibiae, and simple occipital region distinguish the Cuban *claviventris* from the following Windward Island form *grenadinus.*

Type.—♂; [Habana ?], Cuba. (J. Gundlach.) [Instituto de Segunda Enseñanza de la Habana.]

Male. Length 5.1 mm. Black, subopaque; the following citrinous: clypeus, mandibles except apices; scapes, pedicel obscurely; pronotal tubercles; middle and hind legs largely (apices of middle femora, and tibiae medially, dusky); hind legs with apices of trochanters, and tibiae annulate at base. Fulvous: abdominal venter and a transverse band on third and fourth tergites. Wings hyaline, iridescent, the apices somewhat infumated. Antennal flagellum pale piceous.

Head rather large, quadrate and subcuboidal; clypeus, front and temples with dense, appressed, bright silvery sericeous pile. Thorax with pleura and propodeum rather densely clothed with bright silvery pile; suture between pronotum and mesonotum very deep. Propodeum bisected by a rather deep impression on posterior face. Hind tibiae very strongly and abruptly swollen beyond the very slender basal fourth.

Abdomen fulgid, elongate; very slender at base; strongly and suddenly clavate at apex. First segment elongate, basal two-thirds cylindrical, swollen at apex.[8]

Allodigm.—♀; Buenas Aires, Sierra de Trinidad, Las Villas (Santa Clara) Province, Cuba. Elevation 2500–3500 feet. May 8–14, 1936. (P. J. Darlington.) [Museum of Comparative Zoölogy, Harvard College.]

Female. Length 6 mm. Opaque nigroaeneous; the following citrinous: palpi, mandibles save red apices; clypeus; scape; pronotal tubercles; all of fore legs; middle legs with coxae, trochanters, basal two-thirds of femora (the apices brunneous), tibiae annulate at base and apex, and tarsi; hind tibiae with an elongate stripe beneath at base. Fulvous: pedicel, flagellar segments beneath; tegulae. Castaneous: abdominal venter except first sternite; third and fourth tergites with a broad basal band; and all of last segment. Wings clear hyaline, iridescent; veins and stigma brunneous.

Head with clypeus, temples, and inner orbits narrowly with a dense, appressed silvery sericeous pile; vertex sparsely clad with inconspicuous, aeneous puberulent hair. Front and vertex nigroaeneous, with a microscopically fine favose sculpture causing surface to appear subopaque. Front with scapal area very shallowly concave, not bisected above by an impressed line, nor below by a carinule, spine or tubercle. Vertex with supra-orbital foveae oval, very small but distinct; ocelli large, arranged in an equilateral triangle, the postocellar line two-thirds the ocellocular distance; simple and normal posteriorly just before the occipital carinule which is distinct though fine. Antennal scapes slender, elongate, two-thirds the vertical eye length, subcylindrical, ecarinate but anterior face flattened; pedicel obterete, about one-fifth (0.227) the length of scape and one and two-thirds the length of first flagellar article; flagellum simple, first segment three-fourths the length of second which is equal in length to third; penult segment one-half the length of simple terete last segment. Clypeus with median length two-fifths the vertical eye length; disc of the well-differentiated median lobe tumid, the apical margin truncate. Mandibles with apices evenly bidentate.

Thorax and propodeum subopaque, sculptured like front and vertex; impunctate; dorsally with a vestiture similar to vertex, pleura and sternum with appressed silvery sericeous pubescence. Pronotum situated below level of the lightly arched mesonotum; dorsal surface not notched medially, ecarinate

[8] These descriptive notes are a paraphrase of Cresson's original description; I have seen no males of *claviventris*. According to Cresson, the type of his *Crabro claviventris* is preserved in the Gundlach Collection of Hymenoptera at the Museum of the Instituto de Segunda Enseñanza de la Habana, Obispo Street, Havana, Cuba. Dr. Henry Skinner, formerly Curator of Insects of the Academy of Natural Sciences of Philadelphia, visited the museum in 1913 and found the collection arranged in thirteen hermetically sealed, glass-top boxes. The specimens appeared to be in good condition, but that of the type-specimens themselves could not be accurately ascertained, although an effort was made to obtain the information.

anteriorly, broadly rounded there and at humeri; suture between pronotum and mesonotum very deep. Mesonotum simple; suture between mesonotum and scutellum deeply impressed but efoveate, widened laterally on each side into a transverse, elongate-cuneate pit; scutellum and postscutellum simple. Mesopleura with episternal suture fine, impressed; mesopleural pit faint. Propodeum with posterior and lateral faces with a moderate vestiture of appressed silvery sericeous pubescence; dorsal face subglabrous, very finely and longitudinally aciculate, anterior margin foveolate, without a defined trigonal enclosure; posterior face with a rather large, immarginate, cuneate impression discally; lateral carinae well developed along posterior face, obsolescent above, bifid ventrally; lateral faces with microscopical sculpture like vertex.

Legs rather stout but simple. Femora stoutly fusiform; fore and middle tibiae cylindrical-obterete; hind tibiae very suddenly and strongly swollen beyond the very slender basal fourth, the outer faces sparsely spinulose. Fore trochanters elongate, slender, obterete, five-eighths the length of fore femora; middle trochanters thick, cylindrical, and five-eighths the length of middle femora.

Fore wing with the marginal cell two and seven-tenths as long as wide and obliquely truncate at apex; radial vein with first abscissa seven-tenths the length of second abscissa, the third abscissa four-tenths the length of second abscissa; transverse cubital vein oblique, inclivous, about one-third (0.35) the length of second abscissa of cubitus which is one and a fourth times as long as first abscissa of cubitus.

Abdomen fulgid; impunctate; with a very fine transverse aciculation on tergites; and with a very sparse, fine and inconspicuous vestiture of puberulent silvery hair. First segment elongate, slender at base, the apical half clavate; remainder of abdomen fusiform-clavate. Last tergite subopaque, with a few scattered acupunctures; pygidial area defined only on apical half and narrowed there, the disc with a feebly elevated trigonal platform.

Distribution.—The present species is confined largely, if not wholly, to Cuba, and is apparently a very uncommon form—at least in collections—for in the several examined I have found only the unique female of *claviventris* described above. In 1866, Gundlach stated he received from Poey a specimen without any definite locality other than "Cuba." Nearly all the other references in literature are based upon Cresson's unique male.

Gowdey has recorded *claviventris* from Jamaica. I have not seen his material which may be this species or perhaps a third, still undescribed Antillean species of *Euplilis*.

Ashmead reported this species as occurring on Grenada, but his material, when studied, proved to be quite different and is described below as *grenadinus*.

Euplilis (Euplilis) grenadinus new species (Plate I, figs. 16, 22.)

Physoscelis claviventris Ashmead, Trans. Ent. Soc. London, 1900, pp. 222, 305, (1900); [♂; GRENADA: Balthazar and Chantilly Estate]. [Not of Cresson, 1865.]

The slender, perfulgid to polite habitus, the black clypeus, the weakly clavate hind tibiae, and the large, pubescent occipital fossae distinguish *grenadinus* from the Cuban *claviventris*.

Type.—♂; Chantilly Estate, Windward side, Grenada, British West Indies. (H. H. Smith.) [United States National Museum.]

Male. Length 4.8 mm. Fulgid black; the following stramineous: palpi, mandibles save for red apices, scapes, pronotal tubercles, fore legs entirely, middle legs distad of and including tips of coxae, apices of hind trochanters, and hind tibiae broadly annulate at base. Fulvous: tegulae and axillary sclerites, pedicel and flagellum (the latter brunneous above). Light brunneous: hind femora and tibiae, first three abdominal segments and all sternites. Wings clear hyaline, iridescent; veins and stigma brunneous.

Head with clypeus, and inner orbits narrowly, with dense appressed silvery sericeous pile; vertex and temples with a very thin clothing of puberulent hair. Front with scapal area gently concave, glabrous, polite; upper portion with fine, indistinct, widely separately acupuncturation, bisected by a faint impression running forward from median ocellus. Vertex for the most part punctured like front; ocelli large, situated in an equilateral triangle, the postocellar line one-half the ocellocular distance; behind the ocellocular on each side of posterior region of head and just before occipital carinule with a large, shallow, round, concave basin which is filled with thick erect puberulent pubescence. Temples punctate like upper front. Occipital carinule moderate, not a complete circle in extent, almost attaining the foveolate hypostomal carinule, the area laterad of the latter polite, almost impunctate. Antennal scapes slender, cylindrical, ecarinate, weakly constricted just above base and before apex, about two-thirds (0.68) the vertical eye length; pedicel cylindrical, one-third the length of scape and two and a half times as long as first flagellar article; flagellum simple, first segment two-thirds length of second which is equal in length to third, penult segment one-half the length of simple, terete, ultimate article. Clypeus with median length nearly three-tenths (0.277) the vertical eye length; flat to gently, transversely arched; median lobe broad, weakly differentiated, the apical margin inconspicuously retuse medially, on each side of which it is repand to a feeble, acute lateral tooth. Mandibles with apices evenly bidentate.

Thorax perfulgid; dorsum with a very weak vestiture of puberulent hair; pleura more noticeably clad with appressed silvery pubescence. Pronotum short, situated below the level of the arched mesonotum; finely, closely punctate; dorsal face weakly notched medially, the anterior margin edged with a weak carinule, humeri broadly rounded. Mesonotum with fine, widely

separated, setigerous acupunctures; mesonotal-scutellar suture deeply impressed but efoveate; axillae simple, immarginate; scutellum gently tumid, punctate like mesonotum; scutellar-postscutellar suture foveolate; postscutellum gently, transversely tumid, punctate like scutellum. Mesopleura punctured like mesonotum; prepectus rounded anteriorly; episternal suture impressed, foveolate; mesopleural pit distinct; metapleura subglabrous, impunctate. Propodeum perfulgid; dorsal face glabrous, polite, impunctate, without a trigonal enclosure, anterior margin foveolate; posterior face thinly clad with short, suberect silvery hair arising from fine, widely separated, setigerous acupunctures, bisected by a wide, shallow, fusiform impression which terminates at base in a short carinule; lateral carinae weakly developed along lower two-thirds of posterior face; lateral faces subglabrous, almost impunctate.

Legs simple, slender. All femora fusiform; fore and middle tibiae cylindrical-obterete, hind tibiae slender at base to moderately clavate at apex and weakly spinulose on outer faces; all tarsi slender, elongate, simple. Fore and middle trochanters elongate: the fore pair about four-tenths (0.42) the length of fore femora; the middle pair one-half the length of middle femora.

Fore wings with radial cell three times as long as wide and obliquely truncate at apex. Radial vein with first abscissa almost three-eighths (0.36) the length of second abscissa; the third abscissa one-fifth the length of second abscissa. Transverse cubital vein oblique, inclivous, one-third the length of second abscissa of cubitus which is subequal in length to first cubital abscissa.

Abdomen petiolate; perfulgid; impunctate. First three segments subglabrous, the remainder with a very thin and inconspicuous vestiture of silvery puberulent hair. First segment very slender, elongate, and clavate at apex; rest of abdomen fusiform, the second and third segments slender, obterete. Ultimate tergite trigonal, without a pygidial area, and almost impunctate.

Female. Unknown.

Ashmead reported this Windward Island form as Cresson's *claviventris* but, as indicated in the introductory remarks, *grenadinus* is very distinct from that Cuban species. The nearest relative of the present species is *E. calverti* which I recently described from western Costa Rica.

ECTEMNIUS Dahlbom

Most of the Antillean pemphilidines belong to the cosmopolitan genus *Ectemnius* and, with the exception of the Cuban *cyanauges* which is the type of the peculiar subgenus *Merospis,* all are referable to the subgenus *Hypocrabro.* The Antillean species of *Ectemnius* are known at present from only the larger islands: no species have been reported or are as yet known from the Leeward or

Windward Islands. The subjoined table will serve to distinguish the known Antillean forms.

Key to the Antillean Species

1. Metallic blue forms, with ivory maculations; males with the fore femora scutate, the fore tarsi strongly flattened, and middle tibiae without an apical calcar. [Subgenus *Merospis*]....**cyanauges** Pate

   Black forms, maculated with yellow; males with the fore femora simple, never scutate, the fore tarsi not strongly flattened, and middle tibiae generally with an apical calcar. [Subgenus *Hypocrabro*].....2

2. Antennal scapes ecarinate lengthwise; abdomen very finely, indistinctly punctate, the first segment subpetiolate, distinctly longer than wide at apex and separated there from remainder of abdomen by a constriction; [AURICEPS GROUP].....3

   Antennal scapes more or less distinctly carinate lengthwise; abdomen with tergites generally distinctly, though sometimes finely, punctate, the first segment not subpetiolate, distinctly broader than long and perfectly sessile with the second segment.....5

3. Head with appressed bright golden pile on clypeus, front and temples; abdomen with last two segments and the venter rufous; prepectus yellow; wings strongly tinged with fulvous; (Cuba).

   auriceps (Cresson)

   Head with a silvery vestiture; abdomen black, without rufous; prepectus black; wings not tinged with fulvous.....4

4. Mesonotal ridges very strong and well developed; clypeus bisected by a strong keel; propodeum strongly costulate; antennal scapes black; abdomen with small lateral spots on fourth and fifth tergites; (Puerto Rico).....**mayeri** (Dewitz)

   Mesonotal ridges weak; clypeus with a weak keel; propodeum finely aciculate; the following eburneous: antennal scapes, postscutellum, small spots laterally on first, fifth and sixth tergites and second and third sternites, the second and fourth tergites with a fascia, that of the second interrupted medially; (Hispaniola)....**taino** new species

5. Abdominal tergites very finely, inconspicuously punctate; mesopleura with sternostirae absent or developed only posteriorly; scutellum rugose or longitudinally striatopunctate; (Cuba).

   continuus (Fabricius)

   Abdominal tergites, particularly the first, distinctly punctate; mesopleura with sternostirae strong, well developed, extending forward to anterior margin of the mesosternum; scutellum polite, with scattered punctures; [CRAESUS GROUP].....6

6. Antennal scapes weakly carinate lengthwise; mesopleura polite, not horizontally striate, and with only a few scattered punctures; clypeus and fifth and sixth abdominal tergites yellow; (Jamaica).
dizoster new species

Antennal scapes very strongly carinate lengthwise; mesopleura rugose or strongly striatorugose; clypeus black; only fifth abdominal tergite banded with yellow; (throughout the Greater Antilles).
craesus (Lepeletier & Brullé)

Subgenus **Hypocrabro** Ashmead

The large and ubiquitous subgenus *Hypocrabro* has six representatives in the Caribbees. One of these, *continuus* (Fabricius) is clearly adventive; the remaining five are indigenous Antillean forms. Of these five, two—*craesus* and *dizoster*—although clearly endemic, are evidently relatively recent derivatives of the Scaber Group which is well represented in the southern United States and Middle and South America. The remaining three species—*auriceps, taino,* and *mayeri*—form a group peculiar to the Greater Antilles; each major island has one representative: Cuba—*auriceps,* Hispaniola—*taino,* and Puerto Rico—*mayeri.* This autochthonous Auriceps Group, characterized by the component forms having the head large and cuboidal, with elongate, ecarinate antennal scapes and an almost impunctate, subpetiolate abdomen, the venter which is distinctly concave in the males, is evidently one of considerable antiquity; it is not very closely related to any of the North, Middle or South American forms known to me. Indeed, it might almost be considered a discrete subgenus. However, I hestitate at present to accord the Auriceps Group such rank: the genus *Ectemnius* already has a plethora of subgenera. Moreover, the subpetiolate abdomen characteristic is a peculiarity of certain other insular *Hypocrabrones:* I have noted the occurrence of it in several species from the East Indies, the Philippines and Formosa.

The Holarctic species of *Hypocrabro* are xyloecetes; they nest in rotten logs, old stumps, dead branches, brambles and canes, or the abandoned holes of wood-boring beetles, and provision their burrows with small flies. One of the Antillean species, *craesus,* has been reared from a rotten log; this same species has also been captured carrying its prey, a small stratiomyid fly.

Ectemnius (Hypocrabro) continuus (Fabricius)

Sphex vaga Auctt., not of Linnaeus, 1758. [*Cf.* Richards, 1937, Trans. R. Ent. Soc. London, LXXXIII, pp. 168–169.]

Crabro continuus Fabricius, Systema Piezatorum, p. 312, no. 21, (1805).

Crabro 6-maculatus Say, Long's Exped. St. Peter's Riv., II, 341, (1824). [Not of Olivier, 1791.]

Ectemnius (*Hypocrabro*) *continuus* Pate, Notulae Naturae (Acad. Nat. Sci. Philadelphia), no. 171, p. 10, (1946). [Synonymy and range in Holarctic Region.]

In the collection of the American Museum of Natural History is a single male specimen of this common, ubiquitous Holarctic species from Santiago de Cuba, Oriente Province, Cuba. Undoubtedly *continuus* must be considered an adventive in the Antilles, and only intensive collecting and observation in the future will determine whether or not this vagile mainland form has become established in the Caribbees.

Ectemnius (Hypocrabro) craesus (Lepeletier & Brullé)
(Plate I, figs. 1, 2, 10, 11.)

Solenius craesus Lepeletier & Brullé, Ann. Soc. Ent. France, III, p. 727, (1835); [♀, ♂; Ile de Cuba, (Colln. Alexandre Lefebvre)].—Dahlbom, Hymen. Europ., I, p. 388, (1845); [♂, ♀; Cuba].—Lepeletier, Hist. Nat. Insect., Hymén., III, p. 132, (1845); [♀, ♂; Cuba].—Lucas *in* Sagra: Hist. fis., pol. y natural de Cuba, VII, p. 767, (1856); [♀; Cuba].

Crabro croesus Smith, Catal. Hymen. Brit. Mus., IV, p. 424, (1856); [Cuba].—Cresson, Proc. Ent. Soc. Philadelphia, IV, p. 152, (1865); [Cuba].—Packard, Proc. Ent. Soc. Philadelphia, VI, p. 73, (1866); [♀; Cuba].—Dewitz, Berlin. Ent. Zeitschr., XXV, p. 200, (1881); [Porto Rico].—Gundlach, Contrib. Entom. Cubana, II, p. 141, (1886); ["all over the island [of Cuba] and Porto Rico"].—Gundlach, An. Soc. Españ. Hist. Nat., XVI, p. 160, (1887); [Puerto-Rico].—Dalla Torre, Catal. Hymen., VIII, p. 595, (1897); [♀, ♂; Cuba].—Ashmead, Trans. Ent. Soc. London, p. 305, (1900); [Cuba. Porto Rico. Jamaica].—Wolcott, Journ. Dept. Agr. Porto Rico, VII, p. 43, (1923); [Porto Rico].—Gowdey, Jamaica Dept. Agr. Ent. Bull. no. 4, p. 97, (1926); [Jamaica].—Wolcott, Journ. Agr. Univ. Puerto Rico, XX, p. 556, (1936); [Puerto Rico: Guayama. Mona Island: (reared from rotten log)].

Types.—♀ and ♂; Cuba. (No other data.) [Museum d'Histoire Naturelle, Paris? (*ex* Collection of M. Alexandre Lefebvre).]

The sessile abdomen, strongly carinate antennal scapes, and bright golden facial pubescence distinguish *craesus* from all other Antillean *Ectemnius*. The characters differentiating *craesus* from its nearest relative, the Jamaican *dizoster,* are presented in the introductory discussion under that species.

Digm.—♀; Cuba. (Poey Collection.) [Academy of Natural Sciences of Philadelphia.]

Female. Length 8 mm. Black; the following citrinous: mandibles save blackish apices; scape, pedicel, and first three flagellar articles; pronotum and tubercles; axillae, scutellum and postscutellum; prepectus and epipleura; abdominal tergites: second with a broad fascia narrowly interrupted medially, third and fourth with large quadrate lateral spots, fifth entirely save for apical margin; all legs distad of coxae. Castaneous: trophi; tegulae and axillary sclerites. Wings hyaline, tinged with fulvous, weakly infumated beyond the cells; veins and stigma castaneous.

Head fulgid; clypeus, and inner and posterior orbits broadly, with dense appressed bright golden sericeous pile; upper front with suberect golden pubescence; vertex and temples posteriorly with a thin and inconspicuous vestiture of puberulent aeneous hair. Front concave, the median glabrous, polite area narrow but not linear; upper front and vertex closely, finely, uniformly punctate throughout; temples with fine, somewhat separated punctures; occipital carina moderate, attaining the posterior angles of the large quadrate oral fossa, the posterior margin of which is truncate; lower surface of head polite, glabrous, very sparsely punctate. Antennae with scapes cylindrical-obterete, very strongly unicarinate lengthwise, almost two-thirds (0.655) the vertical eye length; pedicel obterete; flagellum simple; relative lengths of pedicel and flagellar articles as follows: pedicel 9; flagellar segment one 10, two 7, three 6, four 6, nine 4, ten 8. Clypeus with median length one-fourth the vertical eye length; the disc flatly tectate and bisected by a strong keel, apical margin of median lobe thickened and gently arcuate. Mandibles with apices tridentate; inner margins with a large basal tooth.

Thorax subfulgid; dorsally with a thin and inconspicuous vestiture of short aeneous hair; pleura and venter with a more noticeable clothing of longer light golden hair. Pronotum strongly and deeply cleft medially; dorsal face transversely swollen, impunctate, anteriorly with a fine carinule roundly and obtusely angulate at humeri and continuous laterally to tubercles; posterior margin very deeply impressed. Mesonotum closely, finely, coriaceously punctate; mesonotal ridges distinct but not strong; axillae immarginate, polite, impunctate; scutellum perfulgid, with scattered, coarse punctures; postscutellum perfulgid, with fine punctures and longitudinal striae. Mesopleura coarsely, strongly, horizontally striatorugose; prepectus strongly, sharply margined anteriorly; sternostirae strong and well developed, extending forward to strongly carinate anterior margin of mesosternum. Metapleura with horizontal costulae. Propodeum subopaque; with a thin clothing

of erect puberulent silvery to light golden hair; dorsal face with radiating grooves separated by carinulae, bisected by a narrow marginate sulcus, and separated from posterior face by a transverse row of large shallow foveolae; posterior face bisected by a strong impression, traversed by a few strong parallel horizontal costulae between which the surface is finely punctato-aciculate; lateral carinae obsolescent; lateral faces finely, horizontally aciculate.

Legs relatively simple. Fore femora subtriquetrous, the outer face margined by a weak carinule. Middle femora somewhat swollen. Middle and hind tibiae spinose on outer faces. Longer hind tibial calcar flattened, subfalcate and five-eighths the length of the hind metatarsi which are subequal in length to the four distal segments combined.

Fore wings with marginal cell three times as long as wide and broadly, obliquely truncate at apex; radius with first and second abscissae subequal in length, the third abscissa one-third the length of the second; transverse cubital vein oblique, inclivous, weakly sigmoid, one and a half times the length of the second abscissa of cubitus which is almost six-tenths (0.56) the length of the first abscissa of cubitus.

Abdomen fulgid; with a thin and inconspicuous vestiture of decumbent, aeneous puberulent hair. First segment short, normal, perfectly sessile with, though separated by a weak constriction from, second segment. Tergites with fine, well separated, setigerous acupunctures throughout. Pygidial area strongly narrowed and excavate apically, the disc with coarse scattered punctures, the lateral margins not heavily fringed with setulae. Sternites with fine cancellate sculpture on which is superposed a few scattered punctures; second to fifth sternites with a transverse, preapical row of setigerous punctures.

Allodigm.—♂; Cuba. (Poey Collection.) [Academy of Natural Sciences of Philadelphia.]

Male. Length 7.5 mm. Agrees with the female except in the following noteworthy details:

Livery and vestiture same except hind femora largely black.

Head with the median polite, glabrous scapal area on front wide; scapes strongly obterete, five-eighths the vertical eye length; relative lengths of pedicel and flagellar articles as follows: pedicel 6; flagellar segment one 7, two 5, three 5, four 5, nine 4, ten 8; flagellum with first four segments longitudinally carinate beneath, the first two somewhat rounded out beneath, the second, third, and fourth gently emarginate below. Clypeus with median length three-tenths the vertical eye length. Mandibles bidentate at apex.

Thorax with pronotum rather sharply angulate at humeri and subdentate there. Mesonotum and scutellum more strongly and coarsely punctate. Propodeum with dorsal and posterior faces strongly, coarsely, irregularly areolate; a series of large, coarse foveae, strongly margined below, separating the two faces; lateral carinae strong and well developed.

Fore femora with outer faces more sharply margined, the lower outer margin with a small tooth basally. Tarsi simple, though middle metatarsi are weakly bowed. Long hind tibial calcar almost two-thirds (0.64) the length of hind metatarsi which are equal in length to four distal segments combined.

Fore wings with marginal cell three times as long as wide. Radius with first abscissa three-fourths the length of second abscissa, the third abscissa one-third the length of second; transverse cubital vein one and a half times the length of the second abscissa of cubitus which is almost one-fourth (0.23) the length of first abscissa.

Abdomen with first segment with well separated, distinct, almost coarse punctures save apically where punctures form a transverse finely punctate band; remaining tergites finely punctate. Ultimate tergite without either a pygidial area or bisected by an impression. Sternites simple, unmodified.

Distribution.—The present species is by far the commonest pemphilidine wasp in the Caribbees. It has been taken throughout every island of the Greater Antilles, and although still unrecorded from any of the Lesser Antilles, it is not unlikely that *craesus* will eventually be found in the Virgin Islands and also on some of the more northern Leewards.

Specimens examined.—74; 41 males, 33 females, as follows:

Bahama Islands: Mangrove Cay, Andros Island; August 1, 1904; (Allen, Barbour, & Bryant): 1 ♀; [M. C. Z.].

Cuba: No other data; (Poey Coll.): 1 ♀, 1 ♂; [A. N. S. P.]; 1 ♀; [M. C. Z.]. *Pinar del Rio Province:* San Vicente; July 26–August 5, 1939; (C. T. Parsons): 1 ♀; [M. C. Z.]. *Habana Province:* Habana; (C. F. Baker): 1 ♀. Santiago de Las Vegas; May 26, 1928; (S. C. Bruner): 1 ♀; [M. C. Z.]; April 13, 1933; (A. Otero; captured with prey, a Stratoimyid fly): 1 ♀; [M. C. Z.]; 1 ♀; [M. C. Z.]. *Las Villas* (*Santa Clara*) *Province:* Cayamas; (C. F. Baker): 1 ♂. Zaza del Media; September 30, 1918: 2 ♀; [A. M. N. H.]. Aguada de Pasajeros; February, 1915: 1 ♂; [A. M. N. H.]. Soledad, near Cienfuegos; August 8, 1920; (Nathan Banks): 1 ♂; [M. C. Z.]; January–February, 1927; (C. T. Brues): 2 ♀; [M. C. Z.]; April 15, 1926; (J. Bequaert): 1 ♂; [M. C. Z.]; April, 1936; (P. J. Darlington): 1 ♂, 1 ♀; [M. C. Z.]. Guabairo, Central Soledad, Cienfuegos; September 2, 1930; (Richard Dow): 2 ♂; [M. C. Z.]. San Blas, Sierra de Trinidad; September 12, 1932; (B. B. Leavitt): 1 ♀; [M. C. Z.]. *Camaguëy Province:* Baraguá; October 5, 1928; (L. C. Scaramuzza; in bushes): 2 ♀, 1 ♂; [M. C. Z.]; September 8; (L. C. Scaramuzza; in grass): 1 ♂; [M. C. Z.]. *Oriente Province:* Banes: 5 ♂, 4 ♀; [M. C. Z.]. Loma del Gato, Sierra del Cobre; elevation 2600–3325 feet; September 24–30, 1935; (J. Acuña, S. C. Bruner & L. C. Scaramuzza): 1 ♂; [M. C. Z.]. Guaro Dam; (J. Bequaert): 3 ♂; [M. C. Z.]. Mountains north of Imías, eastern Oriente, elevation 3000–4000 feet; July 25–28, 1936; (P. J. Darlington): 1 ♀; [M. C. Z.].

Santiago de Cuba: 2♀; [A. M. N. H.]. Guantánamo; February 9, 1914; (H. Skinner): 2♂; [A. N. S. P.].

JAMAICA: [Port Antonio] Portland [Parish. April–May, 1891. (Johnson & Fox.)]: 1♂, 1♀; [A. N. S. P.]; 3♂, 3♀; [U. S. N. M.]. Balaclava; May 1; (A. E. Wight): 1♂. King's Hollow District, St. Andrews; elevation about 600 feet; September 4, 1920: 1♂; [A. M. N. H.].

HISPANIOLA: *Haiti:* Dessorces; elevation about 100 feet; (March 2, 1922: 1♂; [A. M. N. H.]. Carrefour; January 2, 1922: 1♀; [A. M. N. H.]. Manneville; November 16–17, 1934; (P. J. Darlington): 2♂; [M. C. Z.]. Mt. Basil, northern Haiti; elevation, 4700 feet; September 9, 1934; (P. J. Darlington): 1♀; [M. C. Z.]. *Dominican Republic:* Guaiamati; July, 1925; (H. E. Box): 1♂; [U. S. N. M.]. Santo Domingo (no other data): 6♂, 2♀; [A. N. S. P.]. San Lorenzo; June 24–26, 1915: 1♀; [A. M. N. H.].

PUERTO RICO: San Juan; 1923; (G. H. Wolcott): 1♀; [U. S. N. M.]. Mayagüez; January 9, 1912; (C. W. Hooker): 1♀; [U. S. N. M.]. Bayamón; January, 1899; (August Busck): 1♂; [U. S. N. M.]. Guayama; October 21, 1932; (R. G. Oakley): 1♂; [U. S. N. M.]. Caguas; May 28–29, 1915: 1♂; [A. M. N. H.].

Variation.—The Cuban and Puerto Rican specimens of *craesus* have a relatively uniform livery, but in some of the material from the Dominican Republic, the maculations are greatly reduced: all the femora are largely black, the thoracic maculations are much smaller while the antennal flagellum is entirely black and the fascia on the fifth abdominal tergite is sometimes interrupted. The last two features are likewise exhibited by some of the Jamaican specimens. However, despite these striking colour differences, there is relatively little significant morphological variation in material from the different Antilles save for minor individual variation in the intensity of the puncturation or the degree of rugosity of the propodeum. Only the specimen from Andros Island in the Bahamas shows any marked individuality: the maculation of this lone female is eburneous and more extensive than the typical Cuban form, and the abdominal tergites have a very fine, close and uniform puncturation throughout. If more material, when available, displays these characteristics, it may be desirable to accord racial status to the Bahaman *craesus*.

Dewitz and Gundlach have commented upon the fact that Puerto Rican specimens of *craesus* differ in the colour of the pubescence from those found in Cuba. Material from the latter island almost invariably has the facial pubescence bright golden, whereas in

those from the other Greater Antilles, this facial vestiture is generally much lighter, almost silvery at times, but nevertheless it always displays a typical golden glint or sheen.

Ethology.—Like its Nearctic relatives *craesus* is a xyloecete and stores its nests with small flies. Wolcott reports that he has reared *craesus* from a rotten log on Mona Island; and at Santiago de las Vegas on Cuba, A. Otero captured a female of this species with its prey, the Stratiomyid fly, *Eulalia* [olim *Odontomyia*] *dorsalis* (Fabricius) [det. M. T. James].* This wasp is probably multivoltine, for it has been taken in practically every month throughout the year.

Ectemnius (Hypocrabro) dizoster[9] new species (Plate I, figs. 3, 12.)

The superficial habitus of *dizoster* is very similar to that of *craesus* which is common and widespread throughout the Greater Antilles. However, in *dizoster* the clypeus is bright yellow and clothed with a thin vestiture of silvery pubescence, while both the fifth and sixth abdominal tergites are entirely yellow, whereas in *craesus* the clypeus is black and covered with bright golden pile and the sixth abdominal tergite is black. Furthermore, the antennal scapes of *dizoster* are very weakly carinate and the mesopleura are polite, with only a few scattered punctures and not at all striate or rugose; conversely in *craesus,* the mesopleura are coarsely rugose and the antennal scapes are sharply carinate lengthwise.

Type.—♂; [Port Antonio], Portland [Parish], Jamaica. [April–May, 1891. (Chas. W. Johnson & Wm. J. Fox.)] [Academy of Natural Sciences of Philadelphia, Type no. 10595.]

Male. Length 8 mm. Black; the following citrinous: clypeus; mandibles except red apices; pronotum dorsally, tubercles; axillae; anterior two-thirds of scutellum; postscutellum; epipleura, prepectus; fore and middle legs distad of coxae save for a light brown stripe on inner faces of femora; hind coxae apically, trochanters, base of hind femora, tibiae; all metatarsi, the four distal segments brunnescent; abdominal tergites: first with a moderate spot laterally on each side, second with a large spot laterally, third and fourth immaculate, fifth and sixth entirely, seventh with a small basal spot laterally on each side. Fore wings moderately infumated; veins and stigma brunneous.

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*I am greatly indebted to Dr. Maurice T. James of the Colorado A. & M. College, Fort Collins, Colorado, for the identification of this fly.

[9] διζωστήρ: two-banded or bifasciate; in allusion to the prominent fasciae on the fifth and sixth abdominal tergites.

Head subquadrate in anterior aspect, transversely subrectangular in dorsal aspect; subfulgid; clypeus laterally, and inner orbits with appressed silvery sericeous pile; vertex with a thin clothing of erect subaeneous hair; temples with a thin vestiture of appressed silvery pubescence. Front concave, the scapal area immarginate above, the glabrous area wide, polite; upper front with moderately fine, close, contiguous punctures becoming slightly separated on vertex; supra-orbital foveae very poorly defined; postocellar line equal to ocellocular distance; temples with fine, well-separated punctures; occipital carina moderate above, weakly flanged and finely foveolate laterally and below, and attaining the posterior angles of the large, subquadrate oral fossa, the adjacent ventral surface of the head perfulgid, with a few scattered punctures. Antennae with scapes three-fifths the vertical eye length, subcylindrical, very weakly and inconspicuously carinate lengthwise; pedicel obterete; relative length of pedicel and flagellar articles as follows: pedicel 3; flagellar article one 3, two 2.5, three 2.5, nine 2, ten 2.5; flagellum with first three segments weakly carinate lengthwise beneath, the fourth weakly and shallowly excavate beneath, the remaining articles normal. Clypeus with median length one-third the vertical eye length, flat laterally to weakly tectate discally and bisected by a weak keel, the disc nitidous, almost impunctate, median lobe with apical margin gently and evenly arcuate. Mandibles with apices bifid; with a large acute tooth on basal third of inner margins.

Thorax subfulgid; with a thin and inconspicuous vestiture dorsally and on pleura. Pronotum with dorsal surface flat, polite, impunctate, notched medially; anterior margin with a high translucent laminate carina which is sinuous and sharply, obtusely angulate at the dentate humeri, the carina continuous along the sides and onto the tubercles. Mesonotum with a rather coarse, close contiguous puncturation throughout except medioposteriorly where punctures are slightly separated and larger; axillae immarginate; scutellum flat, with a few scattered coarse punctures; postscutellum polite, impunctate. Mesopleura with prepectus polite, practically impunctate, the remainder with only a few scattered moderate punctures, dorsoposteriorly behind episternal suture weakly horizontally striate; episternal suture impressed, weakly foveolate; prepectus and mesosternum strongly carinate anteriorly; sternostirae strong, well developed, sinuous, foveolate externally, extending forward to anterior margin of mesosternum. Metapleura glabrous, with parallel horizontal rugulae. Propodeum subopaque; dorsal and posterior faces very coarsely, irregularly areolate; lateral faces with coarse, parallel, horizontal rugae.

Legs simple, unmodified. Fore femora subfusiform, lower posterior edge margined almost to apex by a carinule. Hind tibiae spinulose on outer faces. Middle and hind metatarsi slender, straight, elongate, subequal in length to four distal segments combined.

Fore wing with marginal cell three and a half times as long as wide, and obliquely truncate at apex. Radius with second abscissa one and one-fifth times the length of first abscissa; transverse cubital vein oblique, inclivous,

sinuous, one and a fifth times the length of the second abscissa of cubitus which is two-ninths (0.22) the length of first abscissa of cubitus.

Abdomen fulgid; first segment perfectly sessile though separated from second segment by a weak constriction. Tergites with a moderately coarse, evenly disposed, separated puncturation throughout; the last tergite without a pygidial area and not bisected by a sulcus or impression. Sternites flatly convex, with fine acupuncturation.

This distinctive Jamaican species is known from only the unique male described above.

Ectemnius (Hypocrabro) auriceps (Cresson)

(Plate I, figs. 5, 13, 14, 18.)

Crabro auriceps Cresson, Proc. Ent. Soc. Philadelphia, IV, p. 150, (1865); [♂; Cuba].—Packard, Proc. Ent. Soc. Philadelphia, VI, pp. 72, 91, (1866); [♂; Cuba].—Gundlach, Contrib. Entom. Cubana, II, p. 140, (1886); ["observed in different localities all over the island" of Cuba].—Dalla Torre, Catal. Hymen., VIII, p. 584, (1897); [♂; Cuba].—Cresson, Mem. Amer. Ent. Soc. no. 1, p. 102, (1916); [♂; Cuba].

Physoscelis auriceps Ashmead, Trans. Ent. Soc. London, p. 305, (1900); [♂; Cuba].

The Cuban *auriceps* together with the Hispaniolan *taino* and *mayeri* from Puerto Rico form a species complex peculiar to the Antilles. The large cuboidal head with elongate, ecarinate antennal scapes, and subpetiolate abdomen, the venter of which is concave in the males, are characteristic features of the Auriceps Group. From the other species of this group, *auriceps* may be distinguished by the bright golden pile of the head, the ferruginous abdominal venter and apex, the bright yellow and ferruginous legs, the more coarsely striate mesopleura and propodeum, and the strongly cristate anterior dorsal margin of the pronotum.

Type.—♂; Cuba. (No other data.) [Academy of Natural Sciences of Philadelphia, Type no. 1912.]

Male. Length 12 mm. Black; the following citrinous: mandibles except red apices; scape and pedicel; pronotum, tubercles; axillae; anterior two-thirds of scutellum; postscutellum; prepectus; all legs distad of coxae (the middle and hind femora fulvo-ferruginous); abdomen: first tergite with a preapical fascia notched anteriorly, second and fourth tergites with a median fascia interrupted medially. Fulvoferruginous: abdominal venter and last three tergites; tegulae and axillary sclerites. Wings hyaline with a strong fulvous tinge and infuscated apically beyond the cells; veins and stigma fulvous.

Head cuboidal; opaque; clypeus, inner and posterior orbits with dense, appressed, sericeous golden pile; vertex with a thin vestiture of aeneous puberulent hair. Front with scapal area concave, the glabrous polite portion moderately wide, opaque, bisected below just above antennal sockets by a short fine carinule; upper front bisected by a fine, impressed line; upper front and vertex closely, finely punctate; vertex with supra-orbital foveae elongate, inconspicuous; ocelli arranged in a very low triangle, the postocellar line subequal (0.96) in length to the ocellocular distance, postocellar line bisected by a very faint, polite longitudinal line; temples finely punctate. Occipital carina moderate above and laterally, becoming weakly flanged below and attaining the posterior angles of the large quadrate oral fossa, laterad of which the lower surface of the head is finely, arcuately striate. Antennae with scapes elongate-subfusiform, ecarinate, two-thirds the vertical eye length; pedicel obterete; relative length of pedicel and flagellar articles as follows: pedicel 15; flagellar article one 36, two 26, three 22, four 21; flagellum with first four segments longitudinally carinulate beneath, the first three segments slightly rounded out below, the fourth strongly emarginate below and with an inconspicuous tuft of short hairs below at apex, remaining segments simple. Clypeus with median length one-fourth the vertical eye length; flat laterally to tumid medially; disc with a low, strong tubercle, distad of which the median lobe is subbevelate, glabrous, polite, with the apical margin gently rounded out. Mandibles with apices bifid; inner margins with a large acute basal tooth.

Thorax subopaque dorsally to fulgid on pleura; dorsally with a thin vestiture of short erect subaeneous pubescence; pleura with longer, decumbent, very light golden hair. Pronotum short, strongly notched medially, anterior dorsal margin with a very strong carina which turns vertically downward at humeri, the lateral margins ecarinate but with a low posthumeral callus laterally on each side; lateral faces strigose. Mesonotum with moderately fine, contiguous puncturation, the extreme anteriolateral angles transversely strigose; mesonotal ridges weak; axillae rounded, immarginate; scutellum and postscutellum with fine scattered punctures. Mesopleura with rather fine punctures and horizontally striate; episternal suture impressed, foveolate; prepectus and mesosternum sharply carinate anteriorly; sternostirae strong, well developed, attaining the anterior carinate margin of mesosternum which is glabrous, polite and with a very few scattered punctures. Metapleura glabrous, subopaque, very finely, horizontally aciculate. Propodeum fulgid; dorsal and posterior faces with erect, light golden hair; dorsal face without a trigonal enclosure, radiately striate, anterior margin strongly foveate, bisected by a very narrow, linear, marginate sulcus which is continued onto and bisects the posterior face also, the lateral areas of which are transversely aciculate and punctate; lateral carinae absent, replaced by a shallow, foveolate groove; lateral faces very finely, horizontally aciculate.

Fore wing with marginal cell three and three-fourths as long as wide, broadly and obliquely truncate at apex. Radius with first abscissa about four-fifths (0.83) the length of the second abscissa; transverse cubital vein

oblique, inclivous, three times the length of the second abscissa of cubitus which is only one-twelfth (0.083) the length of the first cubital abscissa. Hind wing with anal lobe oblanceolate, well separated off, and one-half the length of submedian cell.

Legs simple. Middle and hind tibiae devoid of spines on outer faces. Tarsi simple; the fore pair somewhat depressed; hind pair weakly compressed.

Abdomen perfulgid; subpetiolate, the first segment slender, one and six-tenths as long as wide at the subnodose apex which is separated from second segment by a very weak constriction. Tergites: first polite, practically impunctate; remainder with fine, uniform, well-separated acupunctures throughout; the last tergite nitidous, without a pygidial area, bisected by a broad, shallow impression, and more coarsely punctate than penult tergite, the apical margin inconspicuously retuse medially. First three sternites flatly convex; the rest shallowly concave, unmodified.

Allodigm.—♂; Santo Tomás, Peninsula de Zapatá, Matanzas Province, Cuba. May 5–9, 1927. (S. C. Bruner & J. Acuña.) [Museum of Comparative Zoölogy, Harvard College.]

Female. Length 12 mm. Similar to the male (type) save in the following noteworthy features:

Head with supra-orbital foveae larger and somewhat more distinct than in male; postocellar line four-fifths the ocellocular distance. Lower surface of head laterad of oral fossa polite, with a few fine, scattered punctures. Antennae with scapes almost two-thirds (0.65) the vertical eye length; flagellum simple; relative lengths of pedicel and flagellar articles as follows: pedicel 5; flagellar article one 8, two 5, three 4, four 3, nine 2, ten 4. Mandibles tridentate at apex; inner margins with a large, strong, acute tooth. Clypeus with median length about one-fourth (0.264) the vertical eye length; median lobe bisected on basal half by a keel, the disc produced into a sharp tubercle which forms the apex of a trigonal, declivent, polite, shallowly concave bevel, the apical margin of which is broadly, shallowly retuse, and laterad of which on each side is a gentle emargination ending in an acute lateral angle.

Thorax and legs as in male.

Abdomen as in male but all sternites convex. Last tergite with pygidial area strongly narrowed and excavate apically, the disc with coarse setigerous punctures, the lateral margins with a weak fringe of stiff golden setulae.

Distribution.—With the exception of one record from Cat Island in the Bahamas, *auriceps* is known at present only from Cuba. Many years ago Gundlach observed that the species occurred in many localities throughout the entire island. It is doubtful if *auriceps* will be found on any of the other Greater Antilles.

Specimens examined: 6; 3 males, 3 females, as follows:
BAHAMA ISLANDS: Arthur's Town, Cat Island; July 27, 1935; (W. J. Clench) : 1 ♀; [M. C. Z.].
CUBA: Cuba; (no other data) : 1 ♂; [*type,* A. N. S. P.]. Estación Central de Agricultura; August 16, 1921; 1 ♀; [M. C. Z.]. *Matanzas Province:* Santo Tomás, Peninsula de Zapatá; May 5–9, 1927; (S. C. Bruner & J. Acuña) : 1 ♀; [*allodigm,* M. C. Z.]. *Las Villas (Santa Clara) Province:* Buenas Aires, Sierra de Trinidad; June 17–23, 1939; (C. T. Parsons) : 1 ♂; [M. C. Z.]. *Oriente Province:* Banes: 1 ♂; [M. C. Z.].

The Cuban material examined agrees with the types in all essential features of livery and structural detail, but the specimen from Cat Island in the Bahamas has the abdominal tergites devoid of rufous and the sternites very dark reddish brown.

Ectemnius (Hypocrabro) taino[10] new species
(Plate I, figs. 4, 19, 20, 21.)

The strongly angulate and produced humeral angles of the pronotum, the weak mesonotal ridges, the finely sculptured propodeum, the yellow scapes, and the abdominal livery distinguish *taino* from its nearest relative the Puerto Rican *mayeri.* Furthermore, in the latter, the wings are fuliginous throughout whereas in *taino* only anterior half of the fore wings are deeply infuscated with the rest of the wings clear hyaline.

Type.—♂; Santo Domingo. (No other data.[11]) [Academy of Natural Sciences of Philadelphia, no. 10592.]

Male. Length 11 mm. Black; the following stramineous: mandibles (apices very dark red), scapes, anterior dorsal margin of pronotum with a narrow stripe broadly interrupted medially, tubercles, postscutellum with a broad stripe narrowly interrupted medially; fore femora above and below, fore tibiae on outer faces; middle femora with a broad stripe below; middle tibiae entirely on inner faces, and on apical half of outer faces; hind tibiae with a long double stripe on apical half of outer faces; hind coxae with a large spot beneath; mesosternum posteriorly just before middle coxae with a pair of small spots; abdomen: first tergite with a small apical spot laterally on each side; second tergite with a large, transverse, cuneate spot laterally on each side; third tergite immaculate; fourth tergite with a moderately wide subapical fascia; fifth tergite with a large transverse cuneate spot laterally on each side; sixth tergite with a narrow transverse stripe laterally on each side; second sternite with a large latero-apical spot on each side; third sternite with a small latero-apical spot on each side. Fulvous: inner faces

[10] After the Taino, an ancient tribe inhabiting the island of Hispaniola.
[11] There is a possibility that this material may have been collected by M. Abbott Frazar about Sanchez in the Samaná region.

of fore femora and tibiae. Fore wings with anterior half deeply infuscated, fuliginous; remainder of fore and hind wings hyaline; veins and stigma dark brunneous.

Head large, cuboidal, subfulgid; clypeus, inner and posterior orbits with dense appressed silvery sericeous pile; vertex with a very thin vestiture of puberulent subaeneous hair; temples with appressed silvery pubescence. Front with scapal area strongly concave, the polite glabrous portion moderately wide, not bisected below by a carinule; finely, contiguously punctate before ocellar region. Vertex with fine, separated acupunctures, the supraorbital foveae not apparent; ocellocular line equal to the postocellar distance; postocellar line bisected by a faint polite line running backward toward occiput. Temples punctate above like vertex to finely strigose below. Occipital carina moderate above and laterally, becoming more or less flanged below and attaining the posterior angles of the large quadrate oral fossa, laterad of which the lower surface of the head is very coarsely strigose. Antennae with scapes elongate subfusiform, almost six-tenths (0.57) the vertical eye length; pedicel obterete; relative length of pedicel and flagellar articles as follows: pedicel 3; flagellar article one 7, two 6, three 5, four 5, nine 2, ten 4; flagellum with first four articles longitudinally carinulate beneath, the first three segments slightly rounded out below, the fourth strongly excised beneath and with a weak pencil of short setulae beneath at apex, remaining segments simple. Clypeus with median length almost one-fourth (0.23) the vertical eye length; flat laterally to weakly tectate discally, bisected by an inconspicuous keel, produced medially into a short lobe, the apical margin of which is arcuate, thickened, polite and glabrous, and inconspicuously notched laterally just before the lateral angles. Mandibles with apices bifid; inner margins with a large acute basal tooth.

Thorax subfulgid; dorsally with a thin vestiture of short light pubescence; pleura more noticeably clad with long, decumbent silvery hair. Pronotum short; very strongly notched medially; anterior dorsal margin straight, very weakly carinate; anterior face vertical; humeri acute, subcarinate; lateral margins subcarinate; lateral faces vertically strigose; posterior dorsal margin very strongly and deeply impressed. Mesonotum lightly arched; closely, finely, transversely striatopunctate anteriorly to merely finely punctate discally and posteriorly; mesonotal ridges very weak; axillae rounded, immarginate; scutellum tumid, fulgid, with fine scattered acupunctures; postscutellum fulgid, with fine scattered punctures. Mesopleura finely, closely punctate and horizontally striate; episternal suture coarsely foveolate; prepectus and mesosternum sharply margined anteriorly; sternostirae strong, well developed on posterior half, absent anteriorly. Metapleura glabrous, horizontally striate. Propodeum fulgid, dorsal and lateral faces glabrous, posterior face with a vestiture of long, erect silvery hair; dorsal face without a defined enclosure, radiately striate, bisected by a narrow, linear, marginate groove; posterior face horizontally striatopunctate, and bisected on lower fourth by a carinule above which is a narrow, linear groove; lateral carinae very weak and indistinct; lateral faces finely, horizontally aciculate.

Legs relatively simple and unmodified. Fore legs with femora and tibiae subtriquetrous; tarsi flattened, depressed. Middle and hind tibiae not spinose on outer faces. Middle metatarsi weakly arcuate. Hind tarsi compressed, the metatarsi as long as the four distal segments combined.

Fore wings with marginal cell three and three-fourths as long as wide and broadly, obliquely truncate at apex; radius with first and second abscissae equal in length, the third abscissa one-third the length of second abscissa. Transverse cubital vein oblique, inclivous, one-fifth the length of first abscissa of radius. Cubitus with second abscissa one-eighth the length of first abscissa. Hind wing with anal lobe small, lanceolate, one-half the length of submedian cell.

Abdomen fulgid, subpetiolate; the first segment slender, twice as long as width of subnodose apex which is separated from second segment by a constriction. Tergites with very fine, well-separated, uniform acupuncturation throughout. Last tergite without a pygidial area, bisected by a weak impression. First three sternites flat to very slightly convex, the remainder concave, unmodified.

Allotype.—♀; Santo Domingo. (No other data.) [Academy of Natural Sciences of Philadelphia.]

Female. Length 12 mm. The following features are solely those noteworthy of difference from the ones given in the foregoing diagnosis of the male (type).

Livery the same except as follows: Postscutellar maculation not interrupted medially; fourth abdominal tergite with fascia interrupted medially; fifth tergite with a small spot laterally; sternites immaculate; fore femora black, with only a small spot beneath at base; fore tibiae black, with only a small spot on outer faces near apex; middle femora with a stripe beneath and tibiae with a small spot on outer face near apex.

Head with the polite, glabrous scapal area on front very narrow, armed medially, a little above antennal sockets, with a small low tubercle. Postocellar line about four-fifths (0.81) the ocellocular distance. Occipital carina not attaining the hind angles of the oral fossa, laterad of which the lower surface of head is polite and glabrous. Antennae simple; scapes ecarinate, three-fourths the vertical eye length; flagellum simple; relative lengths of pedicel and flagellar articles as follows: pedicel 4; flagellar article one 6, two 5, three 4, four 4, nine 3, ten 5. Clypeus with median length about one-fifth (0.214) the vertical eye length; more strongly tectate than in male and bisected by a stronger keel which ends apically in a trigonal deflexed polite bevel, the apical margin of which is truncate, and laterad of which on each side is a small tooth. Mandibles with apices tridentate; armed with a large acute tooth on basal third of inner margins.

Thorax as in male but pronotum with anterior dorsal margin ecarinate, the humeri denticulate. Sternostirae shorter than in male.

Fore metatarsi with a weak pecten. Middle and hind tibiae spinulose on outer faces.

Fore wings with marginal cell three and a half times as long as wide. Radius with second abscissa nine-tenths the length of first, the third abscissa one-third the length of second abscissa; transverse cubital vein one-third the length of second abscissa of radius and one and a half times as long as second abscissa of cubitus which is only one-eighth the length of first abscissa of cubitus.

Abdomen with first segment one and four-tenths as long as wide at apex. Last tergite with pygidial area one and four-tenths as long as wide at base, narrowed and excavate apically, the disc with scattered coarse punctures, the lateral margins fringed with stiff setulae. All sternites convex.

Paratype.—♂; Villa Altagracia, Dominican Republic; July, 1938; (P. J. Darlington); [Museum of Comparative Zoölogy, Harvard College].

The paratype agrees with the type in all essential respects save that the dorsal face of the propodeum is finely, transversely striato-punctate.

This distinctive species is known from only the Dominican portion of the island of Hispaniola.

Ectemnius (Hypocrabro) mayeri (Dewitz)

Crabro Mayeri Dewitz, Berlin. Entom. Zeitschr., xxv, p. 201, figs. 4, 4a, 4b, (1881); [♂; Porto Rico].—Gundlach, An. Soc. Españ. Hist. Nat., xvi, p. 160, (1887); ["in the vicinity of Mayagüez," Puerto Rico].—Dalla Torre, Catal. Hymen., viii, p. 610, (1897); [♂; Porto Rico].—Ashmead, Trans. Ent. Soc. London, p. 305, (1900); [Porto Rico].—Wolcott, Journ. Dept. Agr. Porto Rico, vii, p. 43, (1923); [Porto Rico; quotes Gundlach].—Wolcott, Journ. Agr. Univ. Puerto Rico, xx, p. 556, [Puerto Rico; quotes Gundlach].

This Puerto Rican species is evidently very closely allied to the preceding Hispaniolan *taino*. From the latter, *mayeri* is distinguished by its very strongly developed mesonotal ridges, strongly sculptured and grooved propodeum, and the livery, particularly the maculations of the abdomen.

Type.—♂; Puerto Rico. (Krug.) [Berlin Zoological Museum.]

Male. Length 11 mm. Black; the following yellow: mandibles on outer side save apices which are black; spots on legs, particularly the fore pair; fourth and fifth abdominal tergites with small spots laterally. Brunneous: scapes at apex, and pedicel. Wings fuliginous; the fore wings with anterior half more strongly infuscated than the remainder of wings.

Head with extremely fine rugulose sculpture; clypeus with appressed sericeous silvery pubescence; front, vertex, and temples with a similar though

thinner clothing of hair. Front with a deep, broad, longitudinal furrow to bases of antennae. Antennal flagellum with fourth segment deeply emarginate beneath. Clypeus bisected by a very strong longitudinal keel.

Thorax with a thin vestiture of shining silvery pubescence. Mesonotum, scutellum, and postscutellum very finely punctate. Mesonotum with three very strong and well-developed, rather close keels medially running backward from anterior margin. Propodeum with dorsal and posterior faces bisected by a narrow marginate furrow; dorsal face with oblique grooves radiating outward and backward from anterior margin; posterior face transversely grooved; lateral faces horizontally grooved.

Legs smooth, shining, not at all spinose.

Abdomen short, compact, subpetiolate; perfulgid; extremely finely punctate. First segment pyriform.[12]

Female. Unknown.

I have seen no material of *mayeri* which is apparently quite rare —at least in collections. Were it not for Gundlach's statement that he captured *mayeri* in the neighbourhood of Mayagüez, I would suspect that the Consul Krug, who forwarded the original unique male to Dewitz in Berlin, had obtained this specimen from some place other than Puerto Rico.

Subgenus **Merospis** Pate

This peculiar endemic Antillean subgenus contains only the following precinctive Cuban species *cyanauges*. The general habitus of *Merospis* is such as to suggest that it may have arisen from the same ancestral stock in which the preceding Auriceps Group had its origin.

Ectemnius (Merospis) cyanauges Pate (Text-fig. 1.)

Ectemnius (*Merospis*) *cyanauges* Pate, Ent. News, LII, p. 123, figs. 1 a–c, (1941); [♂; San Vicente, Cuba].

The brilliant metallic blue color, ivory maculations, and distinctive shape of the fore legs will immediately distinguish *cyanauges* from all other Antillean pemphilidine wasps.

Type.—♂; San Vicente, Pinar del Rio Province, Cuba. July 20—August 5, 1939. (C. T. Parsons.) [Museum of Comparative Zoölogy, Harvard College.]

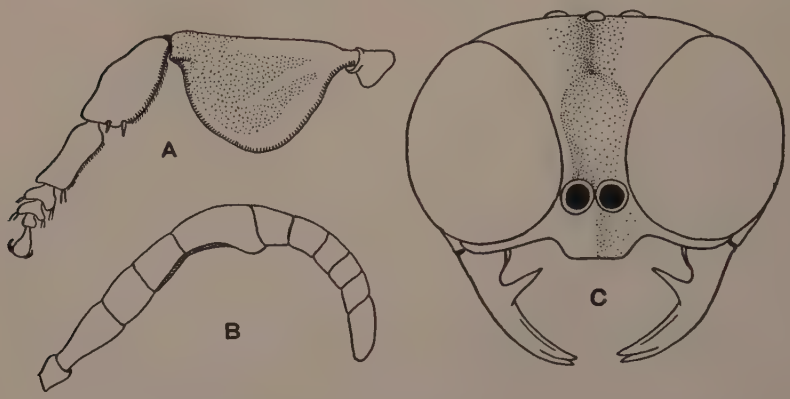
Male. Length 7 mm. Bright cyaneous; the following eburneous: scapes anteriorly; mandibles on outer basal two-thirds; pronotum and tubercles above; postscutellum; all tibiae on outer faces; fore femora with a small spot

[12] These descriptive notes are a paraphrase of Dewitz's original description.

at knee; middle femora beneath; fore metatarsi; abdomen with narrow, elongate, transverse spots laterally on first six tergites, those on second and fourth segments much longer and wider than the others. Black: scape behind, pedicel, and flagellum; mandibles apically and on inner and outer margins. Tegulae, axillary sclerites, and middle and hind tarsi, dark brunneous. Castaneous: fore trochanters; fore femoral shield with fore and hind margins and a narrow discal streak. Wings hyaline, infumated anteriorly particularly in marginal and submarginal cells; veins and stigma dark brunneous.

Head fulgid; clypeus, and lower, inner, and posterior orbits, with dense appressed silvery sericeous pile; vertex, occiput, and temples with rather long, suberect, inconspicuous, dark gray pubescence. Front with scapal area strongly concave, the polite, glabrous area wide; upper front, vertex, and temples, with fine, scattered, setigerous acupuncturation; bisected anteriorly by a strong furrow running forward from median ocellus to scapal basin; supra-orbital foveae not apparent; ocelli arranged in a very low triangle; postocellar line six-tenths the length of the ocellocular distance; occipital carina flanged but efoveate anteriorly and attaining the hind angles of the trapeziform oral fossa, the posterior margin of which is inconspicuously lobed. Antennae short, reaching about to occiput; scapes cylindrical, ecarinate, four-sevenths (0.572) the vertical eye length; pedicel subcylindrical; relative lengths of pedicel and flagellar articles as follows: pedicel 8; flagellar segment one 15, two 10, three 9, four 15, five 6, nine 6, ten 12; first four segments elongate, weakly bicarinate beneath; third segment weakly, and fourth deeply, emarginate beneath; the last article simple, terete. Clypeus with median length two-sevenths (0.286) the vertical eye length; flat laterally to very weakly tectate discally; produced medio-apically into a short broad truncate lobe, the apical width of which is subequal to median clypeal length. Mandibles evenly bidentate at apex; inner margins at base with a very large, elongate, inwardly directed, acuminate tooth.

Thorax fulgid; clothed throughout with a moderate vestiture of long, suberect, light pubescence. Pronotum short, deeply notched medially; anterior dorsal margin sharply carinate, humeri dentate and with a carinule descending vertically from them; lateral margins rounded, ecarinate; posterior margin very strongly impressed. Mesonotum with well-separated, distinct, setigerous punctures throughout, anteriorly with a few weak, curved, transverse, indistinct striae, mesonotal ridges distinct on anterior half but not very well developed; suture between mesonotum and scutellum simple, efoveate; scutellum perfulgid, flatly tumid, very sparsely acupunctate, posterior margin abruptly and deeply impressed and foveolate; axillae rounded, immarginate; postscutellum transverse, linear, short, one-half length of scutellum, perfulgid, subnitidous, almost impunctate. Mesopleura impunctate but with fine and coarse, subhorizontal, subparallel costulae more or less continuous onto metapleura and lateral and posterior faces of propodeum; mesopleural pit almost obliterated by striation; sternostirae absent or developed weakly only posteriorly; prepectus anteriorly with a sharp epicnemium, the carina forking



Text-fig. 1. *Ectemnius* (*Merospis*) *cyanauges* Pate: A, fore leg of male; B, pedicel and antennal flagellum of male; C, anterior aspect of head of male.

dorsally into carinules which parallel the lower and posterior margins of the pronotal tubercles. Mesosternum sharply carinate anteriorly. Propodeum perfulgid; clothed with a pubescence similar to that of thorax; entire dorsal face with an undemarcated, transverse, subrectangular area traversed by subparallel, longitudinal costulae; posterior face bisected by a deep, narrow, nitidous sulcus, and crossed by horizontal, parallel, rugulae which are continuous from lateral faces; lateral carinae completely lacking.

Fore legs with opposing faces of coxae flat, closely appressed to one another and furnished anteriorly with a sharp longtiudinal carina, the distal posterior margin projecting backward and downward in a thin, translucent, semicircular, laminate plate. Fore trochanters flattened and somewhat expanded. Fore femora thin, flat, and dilated into an irregular trigonal shield, but without spines or teeth beneath. Fore tibiae strongly depressed and flattened, elongate trigonal in shape; the tibial spur preapical in position, situated two-thirds of the way from base. Fore tarsi strongly flattened, the metatarsi as long as the four distal segments combined. Middle and hind legs normal; tibiae not spinose; metatarsi slender, one and a third times as long as four distal segments combined; longer hind tibial calcar one half the length of hind metatarsi. Middle tibiae without a calcar; hind tibiae with two calcaria.

Fore wings with marginal cell three times as long as wide and broadly, obliquely truncate at apex; radial vein with first abscissa about six-sevenths (0.844) the length of second abscissa, the third abscissa one-third the length of second; transverse cubital vein oblique, inclivous, twice the length of second abscissa of cubitus which is one-eighth the length of first abscissa. Hind wings slender, elongate, stalked at base; the anal lobe very small, vestigial.

Abdomen sessile, perfulgid; tergites with sparse, well-separated, very fine acupuncturation; the ultimate tergite without a pygidial area, somewhat more distinctly, closely punctate than preceding segment and with a median longi-

tudinal furrow; penult tergite with an inconspicuous, transverse median constriction and last tergite with a stronger, more perceptible one. Venter with first three segments flatly convex, perfulgid, subnitidous, glabrous, with microscopically fine cancellate sculpture; fourth, fifth and sixth sternites flatly concave, subopaque, with close, fine acupuncturation; seventh and eighth sternites flat, densely pilose, seventh with a deep, roundly V-shaped emargination posteriorly, eighth with caudal margin shallowly, broadly, circularly emarginate.

This strikingly colored species is still known from only the unique male described above.

LESTICA Billberg

This cosmopolitan genus is represented in the Antillean Region by only the following species from Cuba. Like all the other New World forms, *cubensis* is referable to the subgenus *Solenius*.

Lestica (Solenius) cubensis (Cresson) (Plate I, figs. 6, 7, 8, 9, 17.)

Crabro cubensis Cresson, Proc. Ent. Soc. Philadelphia, IV, p. 152, (1865); [♀; Cuba].—Packard, Proc. Ent. Soc. Philadelphia, VI, p. 72 (1866); [♀; Cuba].—Gundlach, Contrib. Entom. Cubana, II, p. 140, (1886); [vicinity of Bemba, Cuba].—Dalla Torre, Catal. Hymen., VIII, p. 595, (1897); [♀; Cuba].—Ashmead, Trans. Ent. Soc. London, p. 305, (1900); [Cuba].—Cresson, Mem. Amer. Ent. Soc. no. 1, p. 103, (1916); [♀; Cuba].

The bright golden pile on the face and clypeus, the maculated mesonotum, the striking conformation of the pronotum, and, in the males, the structure of the antennal flagellum differentiate *cubensis* from all the continental New World forms of *Lestica*.

Type.—♀; Cuba. (No other data.) [Academy of Natural Sciences of Philadelphia, Type no. 1898.]

Female. Length 11 mm. Black; the following citrinous: scape, pedicel, and first two flagellar articles; pronotum to and including the tubercles; mesonotum with a large trigonal spot at each anteriolateral corner; axillae, scutellum and postscutellum; abdomen with a large, transverse, elongate oval spot on each side of first five tergites; all legs distad of coxae save apical two-thirds of hind femora which are black. Tegulae castaneous. Wings hyaline, stronged tinged with castaneous basally to fuliginous apically; stigma and veins on basal half dark castaneous to brunneous apically.

Head subcuboidal; fulgid; clypeus, inner orbits, broadly, and temples with appressed sericeous bright golden pile. Front moderately concave; scapal area medially polite, glabrous, impunctate; upper front with moderate, close puncturation becoming finer and closer posteriorly on vertex and temples; supra-orbital foveae distinct, very large, oval; ocelli arranged in a low tri-

angle, the ocellocular line about seven-tenths (0.715) the postocellar distance; occipital carina moderate, weakly flanged below and almost attaining the hind angles of the hypostomal carinule bordering the large quadrate oral fossa, the posterior margin of which is furnished with a low, obtusely pointed lobe medially; lower surface of head and lower posterior portion of temples polite, glabrous, almost impunctate. Antennae with scapes subcylindrical, strongly unicarinate lengthwise, almost three-fifths (0.573) the vertical eye length; pedicel obterete, three-fourths the length of first flagellar article; flagellum simple, the first segment one and a half times as long as the second which is one and three-tenths as long as third, penult segment one-half the length of simple terete last article. Clypeus with median length one-third the vertical eye length, bisected by a strong keel, projecting medially into a long narrow truncate lobe with a strong but much shorter tooth, separated by a large emargination, on each side. Mandibles with apices tridentate; inner margins medially with a low obtuse dentiform angle.

Thorax fulgid; dorsum glabrous, pleura with very sparse, decumbent aeneous hair. Pronotum short, very deeply notched medially, anterior dorsal margin with a very strong laminate carina terminating at each humeral angle in a large strong spine, and furrowed behind carina then followed by a strong transverse torus; lateral margins rounded, ecarinate; posterior margin very strongly impressed. Mesonotum very coarsely punctate, the punctures contiguous and semiconfluent anteriorly to separated and punctatostriate mediposteriorly; axillae immarginate laterally, coarsely punctate; suture between mesonotum and scutellum deeply impressed, finely punctate; scutellum with separated, coarse punctures; postscutellum finely, longitudinally striate. Mesopleura with widely separated, setigerous, alveolate punctures; prepectus sharply margined anteriorly; episternal suture impressed, foveolate; mesopleural pit large, distinct. Metapleura glabrous, opaque; with coarse, well-separated, horizontal costulae. Propodeum very short, opaque, subglabrous; dorsal face irregularly, radiately, coarsely areolate, bisected by a wide marginate furrow which continues onto the posterior face becoming linear there; posterior face coarsely, irregularly areolate, the disc with a shallow, cuneate impression; lateral carinae absent; lateral faces matt, traversed by well-separated, horizontal costulae.

Legs relatively simple. Fore femora subtriquetrous, their outer faces flat and margined by a carinule; middle and hind femora stoutly fusiform. Fore tibiae subtriquetrous; middle and hind tibiae stoutly obterete, the hind pair strongly spinose on outer faces. Tarsi long and slender; the fore metatarsi elongate, slender, weakly bowed, ventral surface with a brush of golden hair, and one and a fifth the length of the four distal segments combined; middle metatarsi slender, slightly curved, and nine-tenths the length of four distal segments combined. Longer hind tibial calcar flat, spatulate, and five-eighths the length of the slender, somewhat compressed hind metatarsi which are one and a third times the length of the four distal segments combined.

Fore wing with marginal cell four times as long as wide, broadly truncate at apex; radial vein with second abscissa one-half the length of first ab-

scissa, the third abscissa one-half the length of second; transverse cubital vein oblique, inclivous, sigmoid, one and a half times the length of the second abscissa of cubitus which is only one-sixth the length of first abscissa.

Abdomen fulgid; very weakly constricted between the segments; with an inconspicuous vestiture of puberulent hair dorsally, the sternites subglabrous but with a transverse, subapical row of erect setulae. First three tergites with rather fine, moderately close, setigerous acupuncturation, becoming more widely separated on fourth, and larger and scattered on fifth. Last tergite with pygidial area narrowed and strongly excavate apically, the disc coarsely rugose, the lateral margins with heavy fringes of coarse golden setulae. Sternites perfulgid; impunctate save for the preapical, transverse row of coarse setigerous punctures; the hypopygium with coarse scattered punctures.

Allodigm.—♂; Lago de Ariguanabo, Habana Province, Cuba. October 15, 1922. (S. C. Bruner & C. H. Ballou.) [Museum of Comparative Zoölogy, Harvard College.]

Male. Length 8.5 mm. Similar to the female (type) except in the following details:

Livery in general the same except that hind femora are completely black. Antennal flagellum dark castaneous above; fulvous beneath.

Head with puncturation of upper front, vertex and upper temples much stronger and coarser. Postocellar line subequal in length to ocellocular distance. Antennae with scapes cylindrical-obterete, ecarinate, five-ninths (0.55) the vertical eye length; pedicel obterete, six-fifths the length of first flagellar article; flagellum finely puberulent, first two segments subequal in length and obterete, gradually widening distad, the following seven subcylindrical, somewhat flattened and continuously and weakly concave below causing these segments to form a continuous concave arc, and each also provided below with a pair of widely separated, weak and inconspicuous tyloides, the third and fourth segments with a weak fringe of hair below, penult and antepenult segments subequal in length; ultimate article two and a half times as long as the penult segment, and subsecuriform, obliquely truncate at apex and fringed there with a few hairs. Clypeus weakly tectate, bisected by a keel; one-third the vertical eye length; produced medially into a truncate lobe, the apical width of which is one-half the median length, and laterad of lobe with a small tooth on each side. Mandibles with apices evenly bidentate.

Thorax essentially the same as in female but propodeum with dorsal, posterior and lateral faces much more coarsely sculptured and areolate.

Fore legs with coxae with a laminate plate projecting from apex behind; trochanters obterete, with a large rounded laminate tooth distally below; femora subtriquetrous, with an acute tooth posteriorly below at base, and basally above on outer face with a thin floccus of white hair; tibiae flattened beneath, and with a number of fine elongate spines on anterior face; tarsi flattened, the metatarsi one and three-tenths as long as the four distal segments combined. Middle legs relatively simple; tibiae without apical calcar, or spines on outer face; metatarsi slender, arcuate, with a row of spinules

beneath, and subequal in length to four distal segments combined. Hind legs relatively normal; tibiae with a few spines on outer faces; calcaria flattened, lorate to flattened and subspatulate at apex, the longer calcar four-sevenths (0.572) the length of the cylindrical metatarsi which are one and four-tenths the length of the four distal segments combined.

Fore wings with marginal cell obliquely and broadly truncate at apex; radial vein with first and second abscissae subequal in length; transverse cubital vein oblique, inclivous, sigmoid, one and a half times the length of second abscissa of cubitus which is about one-fifth (0.22) the length of first cubital abscissa.

Abdomen sessile, elongate oval; with a very thin vestiture of puberulent light hair. Tergites with relatively fine, separated, setigerous punctures throughout. Ultimate tergite without a pygidial area but bisected by a faint impression. Sternites with very fine, close puncturation laterally but almost impunctate medially; second sternite with customary finely punctate oval spot laterally on each side; fourth to seventh sternites clothed with a short, light golden pile throughout, and their apical margins truncate. Hypopygium flat, glabrous, apex retuse, each distolateral angle with a pencil of elongate golden setulae.

Distribution.—This species is common and widespread throughout, but apparently confined to, the island of Cuba. Nothing is known about the biology of *cubensis,* but in all probability, like its North American congeners, it nests in rotten wood or the abandoned burrows of wood-boring beetles and provisions its nests with small moths or flies.

Specimens examined.—14; 8 females, 6 males, as follows:

CUBA: *Pinar del Rio Province:* Sierra Rangel;* August 28, 1929; (J. Acuña & S. C. Bruner): 1 ♂; [M. C. Z.]. Cayos de los Colorados; October, 1923; (C. Enamorado): 1 ♀; [M. C. Z.]. San Vicente; July 25–August 5, 1939; (C. T. Parsons): 1 ♀; [M. C. Z.]. Seven kilometers north of Viñales; September 16–22, 1913; 1 ♀; [A. M. N. H.]. Peninsula de Guanahacabibes; August, 1935; (J. M. Osorio): 1 ♂. *Habana Province:* "Cuba"; (no other data): 3 ♀; [*type* and *paratypes;* A. N. S. P.]. Lago de Ariguanabo; October 15, 1922; (S. C. Bruner & C. H. Ballou): 1 ♂; [M. C. Z.]. *Las Villas* (*Santa Clara*) *Province:* San José, Sierra de Trinidad; August 30, 1930); (Richard Dow): 1 ♀; [M. C. Z.]. Soledad near Cienfuegos; June 7, 1918; 1 ♂; [A. M. N. H.]: June 27, 1939; (M. Bates & G. B. Fairchild): 1 ♂; [M. C. Z.]. *Oriente Province:* Banes: 1 ♂; [M. C. Z.]. Santiago de Cuba: 1 ♀; [A. M. N. H.].

The material studied agrees with the types in all essential features of livery and structural detail.

* "Sierra de Rangel" is a local term given to a section of the Sierra de los Organos, a relatively short distance northwest of the town of San Cristóbal.

Explanation of Figures

Plate I

Fig. 1.—*Ectemnius craesus* (L. & B.) : pronotum of female, dorsal aspect.
Fig. 2.—*Ectemnius craesus* (L. & B.) ; pronotum of male, dorsal aspect.
Fig. 3.—*Ectemnius dizoster* new species: pronotum of male, dorsal aspect.
Fig. 4.—*Ectemnius taino* new species: pronotum of male, dorsal aspect.
Fig. 5.—*Ectemnius auriceps* (Cresson) : pronotum of male, dorsal aspect.
Fig. 6.—*Lestica cubensis* (Cresson) : pronotum of female, dorsal aspect.
Fig. 7.—*Lestica cubensis* (Cresson) : pronotum of male, dorsal aspect.
Fig. 8.—*Lestica cubensis* (Cresson) : clypeus of female.
Fig. 9.—*Lestica cubensis* (Cresson) : clypeus of male.
Fig. 10.—*Ectemnius craesus* (L. & B.) : clypeus of female.
Fig. 11.—*Ectemnius craesus* (L. & B.) : clypeus of male.
Fig. 12.—*Ectemnius dizoster* new species: clypeus of male.
Fig. 13.—*Ectemnius auriceps* (Cresson) : clypeus of female.
Fig. 14.—*Ectemnius auriceps* (Cresson) : clypeus of male.
Fig. 15.—*Euplilis claviventris* (Cresson) : clypeus of female.
Fig. 16.—*Euplilis grenadinus* new species: clypeus of male.
Fig. 17.—*Lestica cubensis* (Cresson) : last three flagellar segments of male.
Fig. 18.—*Ectemnius auriceps* (Cresson) : first five flagellar segments of male.
Fig. 19.—*Ectemnius taino* new species: clypeus of female.
Fig. 20.—*Ectemnius taino* new species: clypeus of male.
Fig. 21.—*Ectemnius taino* new species: first five flagellar segments of male.
Fig. 22.—*Euplilis grenadinus* new species: hind tibiae of male.
Fig. 23.—*Euplilis claviventris* (Cresson) : hind tibiae of female.

(All figures drawn to same scale, except Fig. 16 which is twice the scale of the others.)

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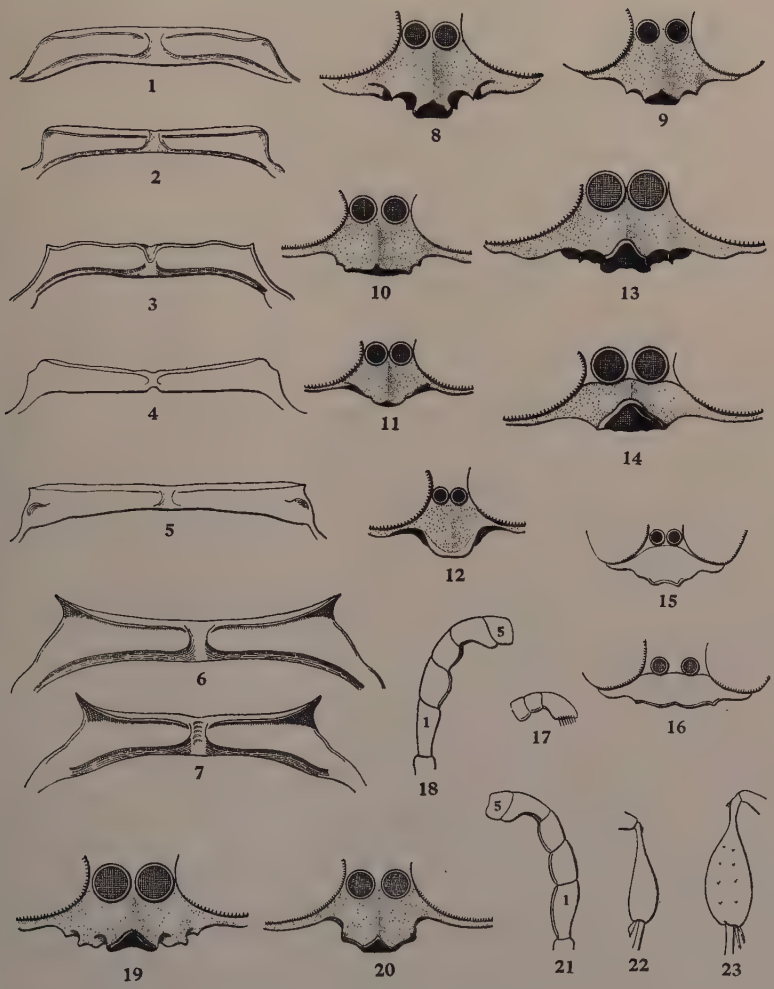

PATE—PEMPHILIDINE WASPS

A SYSTEMATIC ANNOTATED ARRANGEMENT OF THE GENERA AND SPECIES OF THE NEOTROPICAL EPHYDRÍDAE (DIPTERA)

II. The Subfamily Notiphilinae

BY EZRA T. CRESSON, JR.

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ADDITIONS AND CORRECTIONS TO THE PREVIOUS PART OF THIS SERIES OF PAPERS

Subfamily PSILOPINAE [1]

On page 138.

Atissa luteipes strike out "new species" and insert

1944. *Atissa luteipes* Cresson, Notulae Nat., Phila., no. 138, p. 2.

The reference to this species should be as above instead of *Atissa luteipes* new species; and the type number is 1661 instead of 6666. Otherwise the type data are the same. This is an unintentional duplication of description and is not one of another species; the 1944 reference above, of course, taking precedence.

Before *Atissiella* on page 139, insert the following:

PTILOMYIA

1900. *Ptilomyia* Coquillett, Proc. U. S. Nat. Mus., XXII, p. 261.

Ptilomyia enigma Coquillett, Proc. U. S. Nat. Mus., XXII, p. 262. [Puerto Rico.]

This genus and species are unknown to me, but the genus probably belongs near *Atissiella,* if not synonymous with it.

On page 143.

[1] These Transactions, LXXI, pp. 129–163, 1946.

Discocerina (Discocerina) obscurella nitidiventris Hendel

Additional record, which is probably correct:

1919. *Discocerina obscurella* Becker, Arc. Merid. Equat. Amer. Sud, x, p. 202. [Ecuador.]

After *Pectinifer* on page 149, insert the following:

DITRICHOPHORA

1914. *Ditrichophora* Cresson, Entom. News, xxv, p. 159.

Ditrichophora polita Edwards, Dipt. Pat. & So. Chile., vi, p. 117, 1933. [Argentina.]

This species is unknown to me.

Notiphilinae

The present paper is the second part of the series on the Neotropical Ephydridae. The first part[1] dealt with the subfamily Psilopinae and should be consulted for the introduction to this series of papers. In the present part fifty-one species are recognized, representing eight genera; fifteen species and subspecies have been described from this region which I am unable to recognize.

In addition to the acknowledgments made for material studied as noted in the first part, I wish to add: Nabours and Sabrosky Tettigid Expedition [NSTE].

Subfamily Notiphilinae

1929. Notiphilinae Cresson, Trans. Amer. Ent. Soc., lv, p. 180.
1931. Notiphilinae Cresson, Dipt. Pat. & So. Chile, vi, p. 93.

In this subfamily, as regards the Neotropical species, the macrochaetae are well developed; the dorsocentrals are arranged 0:1,1, often 1:1,1; the frontorbitals are proclinate and the frontals usually are present and always reclinate; the medifacies is bare and the facial series of setae are more or less vertical, paralleling the orbits.

Key to the Neotropical Genera of the Notiphilinae

1. Ocellars generally weaker than (rarely as strong) as the postocellars; eyes generally distinctly pilose; costa attaining vein V.....2
   Ocellars generally stronger than postocellars, the latter often minute or wanting; eyes bare; lunule not developed; posterior notopleural weak (Tribe Notiphilini).....6

2. Posterior notopleural aligned with anterior one and near ventral margin of notopleura; lunule conspicuous.
Hydrellia Robineau-Desvoidy
Posterior notopleural removed dorsad from the ventral margin.....3
3. Face swollen, with nose-like profile; wings rather uniformly spotted (Tribe Ilytheini).....4
Face not swollen, nor with a nose-like prominent profile (Tribe Hydrinini).....5
4. Vein II short, almost straight to costa; costal section II and III almost equal in length.....**Zeros** Cresson
Vein II long, much of it paralleling the costa; costal section II much longer than III; only one postsutural dorsocentral present.
Ilythea Haliday
5. Arista bare; antesutural dorsocentral present.
Hydrina Robineau-Desvoidy
Arista short to long haired; antesutural dorsocentral absent.
Nostima Coquillett
6. Mid tibiae with one to four erect extensors, the basal one always present; generally opaque, pollinose species.....7
Mid tibiae without erect extensors; shining black, Psilopa-like species.....**Typopsilopa** Cresson
7. Costa attaining vein IV; ocellars cephalad of line of anterior ocellus; antennal spine weak.....8
Costa not attaining vein IV; ocellars not cephalad of anterior ocellus; antennal spine strong; frontorbitals weak.....**Notiphila** Fallen
8. Mesonotal setulae well developed; sternopleural seta present.
Paralimna Loew
Mesonotal setulae undeveloped or absent; no sternopleural seta present.....**Oedenops** Becker

Tribe Hydrelliini

1943. Hydrelliini Cresson, Trans. Amer. Ent. Soc., LXX, p. 163.

HYDRELLIA

1830. *Hydrellia* Robineau-Desvoidy, Essai Myod., p. 790.

Hydrellia xanthocera Cresson

1938. *Hydrellia xanthocera* Cresson, Rev. de Entom., VIII, p. 33. [Brazil.]

The face here is golden, sericeous and the third antennal segment is yellow.

Hydrellia tibialis Cresson

1918. *Hydrellia tibialis* Cresson, Entom. News, XXVIII, p. 341. [United States.]

1918. *Hydrellia tibialis* Cresson, Trans. Amer. Ent. Soc., LXIV, p. 48. [Costa Rica.]

MEXICO: Tampico, XII 29, sweeping from weeds, [INHS, 1]. ?BOLIVIA: Rosario Lake, Rogagua, X 28–XI 19, (R. E. Shannon); Tumupesa, (W. M. Mann); [all USNM, 4].

Hydrellia spinicornis Cresson

1918. *Hydrellia spinicornis* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 48, pl. 3, fig. 5. [Costa Rica.]

Hydrellia vulgaris Cresson

1918. *Hydrellia vulgaris* Cresson, Dipt. Pat. & So. Chile, VI, p. 94. [Chile.]

1918. *Hydrellia hypoleuca* Cresson not Loew, Trans. Amer. Ent. Soc., XLIV, p. 49. [Costa Rica.]

GUATEMALA: El Salto, Antigua, V 1, (J. M. Aldrich), [USNM, 1]. BOLIVIA: Rosario Lake, Rogagua, X 28–XI 9, (W. M. Mann), [USNM, 1].

This is apparently the Neotropical representative of the more northern *H. griseola* (Fallen), and may prove to be a subspecies of that Holarctic member of the genus. Becker's record of *griseola* from Ecuador [2] is probably of this species.

Hydrellia obscuripes Loew, Monogr. Dipt. No. Amer., I, p. 150, 1862. Becker, Arc. Merid. Equat. Amer. Sud, X, p. 204, 1919. [Ecuador.]

I doubt if this form of *griseola* occurs in South America.

Hydrellia osorno Cresson

1931. *Hydrellia osorno* Cresson, Dipt. Pat. & So. Chile, VI, p. 96. [Chile.]

This species belongs to the group containing the European *H. geniculata* Stenhammar. The terminalia of the abdomen is quite different than in the other species of the genus.

Hydrellia parva Williston, Trans. Ent. Soc. London, 1896, p. 399, pl. 13, fig. 143, of wing. [St. Vincent Island.]

This species is unknown to me, and probably is not a member of the genus. Williston states that "this species belongs doubtfully in this genus." The short second vein of the wings as shown certainly is not characteristic.

[2] Arc. Merid. Equat. Amer. Sud, X, p. 203, 1919.

Key to the Neotropical Species of the Genus Hydrellia

1. Palpi black.....5
   Palpi yellow.....2
2. Frons, scutellum and notopleura, opaque velvety-black; antesutural dorsocentral absent; face sericeous, yellow.....**xanthocera** Cresson
   Frons and scutellum not entirely velvety-black.....3
3. Face ochraceous dorsad, niveous ventrad including cheeks. **osorno** Cresson
   Face unicolorous.....4
4. Fore tarsi entirely and mid and hind ones, for the most part, dark; arista with five to six hairs; antenna II without apical spine; fore femur of females without flexor comb.....**vulgaris** Cresson
   Fore metatarsus and most of mid and hind tarsi, pale; arista with eight hairs; antenna II of male with distinct apical spine; fore femur of females with anterio-flexor comb of minute spinules. **spinicornis** Cresson
5. Antesutural dorsocentral not developed; vestiture of face niveous; mesonotum without metallic reflections.....**tibialis** Cresson
   Antesutural dorsocentral well developed and well separated from postsutural one; vestiture of face yellow; mesonotum with metallic reflections.....**calverti** Cresson

Tribe Hydrinini

1944. Hydrinini Cresson, Trans. Amer. Ent. Soc., LXX, p. 175.

NOSTIMA

1900. *Nostima* Coquillett, Can. Entom., XXXII, p. 35.
1917. *Philygriola* Hendel, Deuts. Ent. Zeits., 1917, p. 42.
1941. *Nostima* Cresson, Notulae Nat. Phila., no. 78, pp. 1–4.
1944. *Nostima* Cresson, Tran. Amer. Ent. Soc., LXX, p. 176. Syn. of *Philygriola*.

The then known Neotropical species of this genus were reviewed in my 1941 paper, and a key to the species was also given. The present treatment includes four additional species.

Subgenus **Nostima**

This typical group, of which *Nostima slossonae* Coquillett is the genotype, is characterized by the uniformly brown or gray, or maculate mesonotum lacking broadly white lateral margins; the abdomen not entirely shining, and the tergites marked with white fasciae or spots.

Nostima (Nostima) gilvipes (Coquillett)

1900. *Hydrellia gilvipes* Coquillett, Proc. U. S. Nat. Mus., XXII, p. 261. [Puerto Rico.]
1918. *Nostima immaculata* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 49. [Costa Rica.]
1941. *Nostima gilvipes* Cresson, Notulae Nat. Phila., no. 78, p. 3. Syn. of *immaculata*.

In this species the second tergite has a white median area, sometimes limited to a rather well-defined apical spot; third tergite with a complete narrow, whitish fascia, sometimes broadening medianly, not broader than the dark, somewhat shining basal band; fourth, much longer than the third and is highly polished, without any niveous fascia or lateral spot; fifth always with a median apical niveous spot. Second costal section at least as long as third.

Nostima (Nostima) abbreviata Cresson

1941. *Nostima abbreviata* Cresson, Notulae Nat. Phila., no. 78, p. 3. [Costa Rica.]

Similar to *gilvipes* in its long polished fourth tergite, but the whitish areas on the second and apical fascia on the third are broader and there is a sharply defined niveous spot on the ventral lobe of the fourth. The second section of the costa is distinctly shorter than the third.

Nostima (Nostima) niveofasciata new species

Similar to *abbreviata* in its short second costal section, but differs from both *gilvipes* and *abbreviata* in having a distinct white apical fascia on tergite IV which curves basad at middle.

The series before me is not in mint condition and further differences are not evident.

TYPE.—Male? Higuito, San Mateo, Costa Rica; (Pablo Schild); [U. S. National Museum].

Paratypes.—3 specimens with same data as type. 1 specimen; San José, Costa Rica, July 15, (H. Schmidt).

Nostima (Nostima) elegantula Hendel

1930. *Nostima elegantula* Hendel, Konowia, IX, p. 141. [Argentina.]
1941. *Nostima elegantula* Cresson, Notulae Nat. Phila., no. 78, p. 4. [Costa Rica.]

In this species the mesonotum is rather distinctly vittate; the face golden yellow with dark facialia; the abdomen is mostly shining,

with a niveous marginal fascia on the second tergite, four marginal spots on the third, more or less coalescent into a fascia; four spots on the fourth, and a median spot on the fifth. The second section of the costa is longer than the third.

Nostima (Nostima) niveivenosa Cresson

1930. *Nostima niveivenosa* Cresson, Entom. News, XLI, p. 80. [Puerto Rico.]

1941. *Nostima niveivenosa* Cresson, Notulae Nat. Phila., no. 78, p. 7. [Argentina, Brazil, Costa Rica.]

This species has the abdomen rather opaque except the fourth tergite. Third tergite with two niveous spots, fourth with four, and fifth with a large median one sometimes separated into two. Second section of costa not as long as third; crossveins conspicuously white.

Nostima (Nostima) spilogaster new species

A species with white crossveins, distinguished from *niveivenosa* by the short, almost opaque fourth tergite with its four white marginal spots.

Yellow are: the face, antennae except upper part of segment III, legs including coxae, halteres and wing veins.

Opaque, but tergite IV may be slightly shining in certain aspects. Vestiture of frons ochraceous, orbits white which continues on the parafacies to cheeks; face yellow to white; posterior orbits and postbucca white. Mesonotum and scutellum brownish; pleura cinereous. Abdomen with four white marginal spots on tergites III and IV. Costal section II about as long as III; crossveins conspicuously white. Length, 1 mm.

TYPE.—Male; Higuito, San Mateo, Costa Rica; (Pablo Schild); [U. S. National Museum].

Nostima (Nostima) canens Cresson

1941. *Nostima canens* Cresson, Notulae Nat. Phila., no. 78, p. 5. [Brazil.]

This species is similar to *schildi,* but the face is whitish; the mesonotum grayish, obscurely vittate; the abdominal tergites with white fasciae only. Second costal section distinctly shorter than the third. A smaller species than *schildi* (1.2 mm.).

Nostima (Nostima) schildi Cresson

1941. *Nostima schildi* Cresson, Notulae Nat. Phila., no. 78, p. 4. [Costa Rica.]

A larger species than *canens* (1.6 mm.); with yellowish face; rather distinctly brown vittate mesonotum; abdomen opaque with white fasciae on third tergite, interrupted medianly; a large median and small ventral spot on fourth and fifth. Second section of costa not or scarcely shorter than the third.

Nostima (Nostima) pulchra (Williston)

1896. *Hydrellia pulchra* Williston, Trans. Ent. Soc. London, 1896, p. 399, pl. 18, fig. 144. [St. Vincent Island.]
1914. *Philygria basalis* Cresson, Entom. News, xxv, p. 246. [Argentina, Paraguay.]
1914. *Nostima pulchra* Hendel, Konowia, ix, p. 141. Syn. of *basalis*.
1938. *Nostima pulchra* Cresson, Rev. de Entom., viii, p. 34. [Brazil.]
1941. *Nostima pulchra* Cresson, Notulae Nat. Phila., no. 78, p. 6, fig. 5.

In this species and the two following, the wings are maculate. The present one has a definite fuscous subbasal band on a clear or yellowish wing.

Nostima (Nostima) slossonae Coquillett

1900. *Nostima slossonae* Coquillett, Can. Entom., xxxii, p. 35. [Florida.]
1914. *Philygria calverti* Cresson, Entom. News, xxv, p. 247. [Costa Rica, Paraguay.]
1918. *Nostima slossonae* Cresson, Trans. Amer. Ent. Soc., xliv, p. 49, pl. 3, fig. 15. Syn. of *calverti*.
1938. *Nostima slossonae* Cresson, Rev. de Entom., viii, p. 33. [Brazil.]
1941. *Nostima slossonae* Cresson, Notulae Nat. Phila., no. 78, p. 5. [Costa Rica, Brazil.]

The wings here are fuscous with clear or whitish intervenous spots.

Nostima (Nostima) ilytheoides Cresson

1914. *Nostima ilytheoides* Cresson, Notulae Nat. Phila., no. 78, p. 8, fig. 4. [Costa Rica.]

Costa Rica: Higuito, San José, (Pablo Schild), [USNM, 7].
The wings are clear with intervenous fuscous spots.

Subgenus **Philygriola**

1917. *Philygriola* Hendel, Deuts. Ent. Zeits., 1917, p. 42.
1944. *Nostima* [(*Philygriola*)] Cresson, Trans. Amer. Ent. Soc., lxx, p. 176.

The species constituting this subgenus are characterized by the broad cinereous to white lateral margins of the mesonotum, which color runs onto the lateral parts of the scutellum, and there, often appears as a niveous spot in caudal aspect. The abdomen is unicolorous, usually shining, without any white fasciae or spots. The white lateral margins of the mesonotum is practically absent in *nitidigaster,* here described. This subgenus is indicated but not defined in my 1944 paper.

The genotype is *Notiphila picta* Fallen, 1813.

Nostima (Philygriola) flavida new species

This species is distinguished by its almost totally pale (yellow) color, the exception being the brown frons, upper part of the scutellum, the black abdomen of the males, the narrow brown apices and median stripes on tergites II to IV and all of V in the females. (These markings of the female are faint and may not be present in all individuals.)

Opaque except the abdomen; the vestiture yellow except the frontal orbits, and those of face and cheeks, occiput and the broad lateral margins of mesonotum and scutellum all of which are white. Abdomen shining black; tergite IV not longer than III. Wings immaculate; costal section II shorter than III. Length, 1 mm.

TYPE.—Male; Higuito, San Mateo, Costa Rica; (Pablo Schild); [U. S. National Museum].

Paratypes.—3 ♀; with same data as for type.

Nostima (Philygriola) nitidigaster new species

A shining species, except head and scutellum, easily recognized by the pale thorax and black abdomen, the latter with long erect pale setae.

Frons brownish except the niveous orbits which appear, in dorsal aspect, as two spots, one of which is at vertex; parafacies white; lower part of face niveous, in dorsal aspect; postbucca white to niveous. Mesonotal white lateral margins (characteristic of the species of this subgenus) are represented by the cinereous humeri and a niveous lateral spot on the scutellum; sternopleura cinereous; scutellum opaque velvety-brown. Halteres white. Wings immaculate; costal section II shorter than III. Length, 1 mm.

TYPE.—Female? Iquitos, Peru; March to April, 1913; (R. C. Shannon); [U. S. National Museum].

HYDRINA

1830. *Hydrina* Robineau-Desvoidy, Myod., p. 794.

Hydrina intensa Cresson

1931. *Hydrina intensa* Cresson, Dipt. Pat. & S. Chile, VI, p. 94. [Patagonia, Argentina.]

Hydrina nitida Williston

1896. *Hydrina nitida* Williston (not of Robineau-Desvoidy, 1830), Trans. Ent. Soc. London, 1896, XIII, p. 400, pl. 13, figs. 145, 145a. [St. Vincent Island.]
1905. *Philygria nitida* Aldrich, Cat. No. Amer. Dipt., p. 627.

Unknown to me. The pectinate arista would remove it from *Hydrina.*

Hydrina nitidifrons Williston, Trans. Ent. Soc. London, 1896, p. 401. [St. Vincent.]

Also unknown to me and if, as the author states, it is in close agreement with *nitida,* it is possibly not a member of the present genus.

Tribe ILYTHEINI

1943. Ilytheini Cresson, Trans. Amer. Ent. Soc., LXIX, p. 1.

ILYTHEA

1839. *Ilythea* Haliday, An. Nat. Hist., III, p. 408.

Ilythea caniceps Cresson

1918. *Ilythea caniceps* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 50. [Costa Rica.]
1943. *Ilythea caniceps* Cresson, Trans. Amer. Ent. Soc., XLIX, p. 8.

Ilythea fusca Cresson

1931. *Ilythea fusca* Cresson, Dipt. Pat. & S. Chile, VI, p. 99, fig. 21a. [Chile.]
1943. *Ilythea fusca* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 9.

This may be the southern and darker form of *caniceps.*

Ilythea niveoguttata Cresson

1931. *Ilythea niveoguttata* Cresson, Dipt. Pat. & S. Chile, VI, p. 99. ♀. [Chile.]
1943. *Ilythea niveogattata* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 9.

Ilythea cressoni Edwards

1933. *Ilythea cressoni* Edwards, Dipt. Pat. & S. Chile, VI, p. 118. ♂. [Patagonia.]
1943. *Ilythea cressoni* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 9.

This may be the male of *niveoguttata,* as suggested by Cresson (1943).

ZEROS

1943. *Zeros* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 10.

Zeros fenestralis (Cresson)

1918. *Ilythea fenestralis* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 51. [Costa Rica.]
1928. *Ilythea fenestralis* Curran, Sci. Surv. P. Rica & Virg. Isl., XI, p. 60. [Porto Rica.]
1930. *Ilythea argyrostoma* Hendel, Konowia, IX, p. 144. [Argentina.]
1931. *Ilythea fenestralis* Cresson, Dipt. Pat. & S. Chile, VI, p. 99. [Uruguay.]
1938. *Ilythea fenestralis* Cresson, Rev. de Entom., VIII, p. 33. [Brazil.]
1943. *Zeros fenestralis* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 12. [Cuba, Panama.]

PUERTO RICO: Arbonito, VI 1–3, [AMNH, 1]. PANAMA: Red Tank, IV 15, (R. C. Shannon); [USNM, 3].

Zeros obscura (Cresson)

1918. *Ilythea obscura* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 52. [Costa Rica.]
1943. *Zeros obscura* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 14. [Guatemala.]

Zeros flavipes (Williston)

1896. *Ilythea? flavipes* Williston, Trans. Ent. Soc. London, 1896, p. 403. [St. Vincent Island.]
1897. *Ilythea flavipes* Williston, Kans. Univ. Quart., VI, p. 4. [Brazil.]
1900. *Ilythea flavipes* Coquillett, Proc. U. S. Nat. Mus., XXII, p. 260. [Puerto Rico.]
1918. *Ilythea flavipes* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 51, pl. 3, figs. 19, 20. [Costa Rica.]
1943. *Zeros flavipes* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 14. [Jamaica, Mexico, Panama, Bolivia.]

Key to the Neotropical Species of Ilythea and Zeros

1. Vein II long, subparallel to III; costal section II several times longer than III; submarginal cell long and narrow.....4
   Vein II short, strongly diverging from III; costal section II at most but slightly longer than III; submarginal short.....2
2. Abdomen polished black, without any trace of vestiture except, at most, on ventral lobes and at apex; wing maculation in form of intervenous fuscous bars, and with but one isolated bar in marginal beyond tip of vein II.....**Zeros flavipes** (Williston)
   Abdomen rather markedly pruinose, which sometimes almost totally obscures the shining surface.....3
3. Vein II straight to costa; maculations of wings sometimes almost obliterated, but always bar-like, the hyaline interspaces rectangular in shape; faint metallic violet or blue color on frons and mesonotum.....**Zeros obscura** (Cresson)
   Vein II undulating and curving into costa; wing maculation strong, the hyaline interspaces sometimes round; strong metallic violet or blue color on frons and mesonotum....**Zeros fenestralis** (Cresson)
4. Leg for the most part, pale brown, with femora distally, and tibiae entirely, paler; three fuscous spots in distal half of submarginal, not including the one opposite posterior cross-vein.
   Ilythea niveoguttata Cresson
   Ilythea cressoni Edwards
   Coxae and femora black; at most two fuscous spots in distal half of submarginal; tibiae paler than femora, yellow to ferrugineous, at most infuscated medianly; vestiture of face somewhat cinereous.
   Ilythea caniceps Cresson
   Ilythea fusca Cresson

Tribe NOTIPHILINI

1946. Notiphilini Cresson, Trans. Amer. Ent. Soc., LXXII, p. 228.

OEDENOPS

1930. *Oedenops* Becker, Mitt. Zool. Mus. Berlin, II, p. 178.

Oedenops nuda (Coquillett)

1902. *Paralimna nuda* Coquillett, Jour. N. Y. Ent. Soc., X, p. 182. [Mexico.]
1929. *Oedenops nuda* Cresson, Trans. Amer. Ent. Soc., LV, p. 183.

HONDURAS: Puerto Castilla, V 27, 28, VI 2, (R. H. Painter), [Painter, 3].

PARALIMNA

1862. *Paralimna* Loew, Monogr. Dipt. No. Amer., I, p. 138.
1862. *Paralimna* Loew, Öfvers. K. Svenska Vet.-Akad. Forh., 1862, p. 13.

Subgenus **Paralimna**

1916. [*Paralimna*] (*Paralimna*) Cresson, Trans. Amer. Ent. Soc., XLII, p. 105.

A group of very difficult species, having few definite differentiating characteristics. Some value may be found in the development of the flexor ciliation of the fore femur. The pattern of the brown and cinereous vestiture offers some assistance in characterizing the species, but usually this feature is extremely variable.

The genus is easily recognized by the robust build of its species, with rather bloated face, well-marked antennal foveae and carina. The color of the vestiture is gray to cinereous, marked with brown dots at the base of the setae which are often obscured by brown areas which latter may almost completely cover particularly the dorsal and lateral surfaces.

Paralimna (Paralimna) secunda Schiner

1868. *Paralimna secunda* Schiner, Reise Novara, Zool., II, Abt. 1, Dipt., p. 241. [Venezuela.]

1916. *Paralimna meridionalis,* in part, Cresson, Trans. Amer. Ent. Soc., XLII, p. 119. [Costa Rica, in part.]

1918. *Paralimna meridionalis* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 46, pl. 3, figs. 13. [Costa Rica, in part.]

1929. *Paralimna secunda* Cresson, Trans. Amer. Ent. Soc., LV, p. 185. Type selection.

MEXICO: Vera Cruz, XII 15, (F. Knab), [USNM, 1]. Tampico, XII 29, [INHS, 1]. GUATEMALA: Coban, Alta Vera Paz, V 15; El Jicar, Zacapa; La Providencia, Obispo, IV 14; (all J. M. Aldrich); [all USNM, 10]. HONDURAS: Lancetilla near Tele, Dept. Atlantida, IX 7, (J. A. G. Rehn; 1930 Honduras Expedition), [ANSP, 2]. COSTA RICA: Higuita, (P. Schild), [USNM, 2]. La Suiza, IV–IX; La Suiza, Turrialba; (all Pablo Schild); [all Mel, 20]. Pedregoso, (D. L. Rounds), [Mel, 3]. San Jose, (A. Alfaro), [ANSP, 3]. PANAMA: Pedro Miguel, IV 10, (R. C. Shannon), [USNM, 3]. COLOMBIA: Aracataca, Magdalena, VIII, 24, 1920 (J. A. G. Rehn), [ANSP, 6]. VENEZUELA: Valle Seco, Carabobo, I, (P. Anduze), [USNM, 1]. BRITISH GUIANA: Bartica, V 22, (R. J. Crew), [ANSP, 1]. PARAGUAY: (Fiebrig), [ANSP, 1].

Apparently the common Neotropical species of the genus; and the type-species of a group in which the fore femur of the males is

not sulcate on flexor surface, nor is the antero-flexor cilia composed of strongly flattened setae.

The face of the present species is broad, generally uniformly cinereous to almost white, with faint to distinct brown or yellow marks. Typically the frons, in profile, is strongly convex, throwing the antennae to about on center-line of the eyes. The post-flexor cilia of the fore femur, particularly of the males, consist of numerous closely set setulae, not appreciably longer proximad; the antero-flexor cilia in the males, for the most part, consist of normal setae; those distad may show some flattening. The brown pattern of the vestiture is rather recessive.

Some individuals may be confused with those of *multipunctata,* but the post-flexor cilia of the fore femur in that species have some long setae.

Paralimna (Paralimna) secunda taurus Cresson

1897. *Paralimna multipunctata* Williston (not of Williston, 1896), Kans. Univ. Quart., VI, p. 5. [Brazil.]

1916. *Paralimna* [(*Paralimna*)] *taurus* Cresson, Trans. Amer. Ent. Soc., XLII, p. 123, pl. 9, fig. 1. [Brazil, Paraguay.]

This form, of which I have seen but a few individuals, is here treated as a subspecies of *secunda,* but it may be only a variety. The head is large, in profile, almost rectangular, long in vertical axis, with frons almost horizontal and but slightly convex, throwing the antennae above center-line of the eyes; otherwise agreeing with *secunda.* Hendel's reference to *meridionalis*[3] from Brazil should probably be referred to this form.

Paralimna (Paralimna) secunda sana Cresson

1929. *Paralimna sana* Cresson, Trans. Amer. Ent. Soc., LV, p. 185. [Paraguay.]

ARGENINA: Tucumán, IV 18, (Rosenfeld & Barber), [OSU, 1]. Bompland, Missiones Terr., I 13–14, (F. & M. Edwards), [BM, 2].

A southern South American subspecies of *secunda.* Smaller in size, with dorsal surfaces darker because of the extensive brown areas. Post-flexor cilia of fore femur consist of relatively short setulae not crowded, rather evenly spaced, and the series is complete.

[3] Ann. Naturh. Mus. Wien, XLVII, p. 100, 1936.

Paralimna (Paralimna) meridionalis Cresson

1916. *Paralimna* [(*Paralimna*)] *meridionalis* Cresson, Trans. Amer. Ent. Soc., XLII, p. 119. [Costa Rica.]

1918. *Paralimna meridionalis* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 46. [Costa Rica in part.]

A member of the *secunda* assemblage, and, as far as known, it occurs only in Costa Rica. It differs from that species in having a more quadrate head profile, caused by the narrow cheek, which in width is, at most, but slightly more than one-quarter of the height of head. The markings on the face are more extensive, often (in the form *brunneiceps*) covering the entire medifacies and facialia. On the whole the brown vestiture is more extensive, the irrorations of the dorsal surfaces generally obscured by brown areas, leaving comparatively little of the gray color. Otherwise the species is similar to *secunda.*

In my earlier determinations (specimens of which have since been distributed) I may have identified some of this species as *secunda.*

Paralimna (Paralimna) brunneiceps Cresson

1916. *Paralimna* [(*Paralimna*)] *brunneiceps* Cresson, Trans. Amer. Ent. Soc., XLII, p. 120. [♂, ♀. Costa Rica, Guatemala, Nicaragua.]

1918. *Paralimna brunneiceps* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 47. [Costa Rica.]

GUATEMALA: Puerto Barrios, III 3–14, [OSU, 1]. Quirigua, V 7, (J. M. Aldrich), [USNM, 1]. COSTA RICA: Higuito, San Mateo, (P. Schild), [USNM, 10]. Pedregoso, (D. L. Rounds), [Mel, 14]. San José, (A. Alfaro), [ANSP, 6]. San José, (H. Schmidt), [USNM, 2]. PANAMA: Barro Colorado, VII 16, (R. C. Shannon), [USNM, 1].

This is probably merely a form of *meridionalis* with the face, except the foveae and parafacies, brown.

Paralimna (Paralimna) flexineuris Cresson

1916. *Paralimna* [(*Paralimna*)] *flexineuris* Cresson, Trans. Amer. Ent. Soc., XLII, p. 111, pl. 9, fig. 8. [Peru.]

PERU: (H. A. Parish), 1914, [USNM, 2]. ECUADOR: (H. A. Parish), 1914, [USNM, 1].

Similar to *secunda,* but the fore femur of the males is not constricted nor noticeably sulcate, the post-flexor ciliation of long well-

separated setae about 8–12 if the series is complete; antero-flexor ciliation also of long setae of which those in the distal part of the series are slightly modified (flattened). The face is cinereous or yellowish and usually with a darker spot on the carina. Irrorations (brown) rather distinct, rarely obscured by brown areas and vittae; mesopleura but slightly discolored dorsad. Wings brownish; posterior crossvein not darker nor clouded.

Paralimna (Paralimna) multipunctata Williston

1896. *Paralimna multipunctata* Williston, Trans. Ent. Soc. London, 1896, p. 390. [St. Vincent Island.]
1912. *Paralimna multipunctata* Grossbeck, Bull. Amer. Mus. Nat. Hist., XXXI, p. 378. Listing types.
1916. *Paralimna* [(*Paralimna*)] *ciliata* Cresson, Trans. Amer. Ent. Soc., XLII, p. 111, pl. 9, fig. 7. [Costa Rica.]
1918. *Paralimna ciliata* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 46, pl. 3, fig. 4. [Costa Rica.]
1928. *Paralimna ciliata* Curran, Sci. Surv. P. Rico & Virg. Isl., XI, p. 60. [St. Thomas Isl., Porto Rico.]

MEXICO: Cuernavaca, XI 5 (E. G. Smyth), [USNM, 2]. CUBA: Guantánamo, II 10, (H. Skinner), [ANSP, 7]. Havana, (C. F. Baker), [USNM, 1]. COSTA RICA: San José, VII (H. Schmidt), [USNM, 1]. VENEZUELA: Valle Seco, Carabobo, I, (P. Anduze), [ANSP, 1].

In this species the face of both sexes is cinereous to white, with or without brown or yellow spot on the carina, but no black spot between the antennae. Irrorations on the thorax rather faint, the brown areas are not extensive, sometimes not present. The species is the type of a group having the fore femur of the males more or less distinctly obliquely sulcate on the flexor surface; with the anterior cilia consisting of many curved, flattened setae; the posterior cilia in both sexes of a few long setae, generally confined to the proximal half. The fore tibia is rather arcuate.

The synonymy of *ciliata* is determined after examining a paratype of *multipunctata* in the collection of the American Museum of Natural History, New York.

Care is to be exercised in separating the present species from *nigropicta,* which latter has a conspicuous black spot between the antennae.

Paralimna (Paralimna) nigropicta Cresson

1916. *Paralimna* [(*Paralimna*)] *nigropicta* Cresson, Trans. Amer. Ent. Soc., XLII, p. 118. [Guatemala.]

MEXICO: Cordoba, I 5, (F. Knab), [USNM, 1]. COSTA RICA: Banana River, XI 9, (P. P. Calvert), [ANSP, 1].

Similar to *multipunctata* but with an opague black spot between the antennae.

Paralimna (Paralimna) pectinata Hendel

1930. *Paralimna pectinata* Hendel, Konowia, IX, p. 131. [♂. Northern Argentina.]

ARGENTINA: Bompland, Missiones Terr., I 13–14, (F. & M. Edwards), [BM, 2]. PARAGUAY: "Incarnacion," I 16, (F. & M. Edwards), [BM, 2]. URUGUAY: Montivideo, I 21–22, (F. & M. Edwards), [BM, 1].

A dark species with the tarsi, for the most part, black; dark areas on the mesonotum extensive, with distinct vittae, but only the mesopleura is irrorated; wings with dark posterior crossvein; post flexor cilia of the male fore femur consisting of a few setae basad.

Paralimna (Paralimna) piger Cresson

1933. *Paralimna piger* Cresson, Entom. News, XLIV, p. 65. [Ecuador.]

Only two males of this species are known to me. The antennae are without any niveous dorsal spot; the dark brown areas of the mesonotum and mesopleura are extensive, obliterating the irrorations; the medifacies and facialia heavily marked with brown; post-flexor cilia of fore femur limited to the proximal part and consist of long setae.

Paralimna (Paralimna) plumbiceps Cresson

1916. *Paralimna* [(*Paralimna*)] *plumbiceps* Cresson, Trans. Amer. Ent. Soc., XLII, p. 110. [Jamaica.]

1928. *Paralimna plumbiceps* Curran, Sci. Surv. P. Rico & Virg. Isl., XI, p. 60. [Porto Rico.]

CUBA: Baracoa, IX, (A. Busck), [USNM, 1]. JAMAICA: Port Antonio, IV, (C. W. Johnson), [John, 2]. Kingston, IV, [US NM, 1].

This species has a narrower frons and face than most of the other species, thte former not broader than long and the latter correspondingly narrow. The cheeks are broad, almost one-third

height of the head. The brown irrorations are faint, the mesonotal vitta distinct; wings with unclouded posterior crossvein.

Paralimna (Paralimna) sera Cresson

1933. *Paralimna sera* Cresson, Entom. News, XLIV, p. 67. [Jamaica.]

A dark species with irrorations considerably obscured by large brown areas on the mesonotum and lower part of the mesopleura; the face is blackened on the upper part. The post-flexor cilia of the male fore femur consist of a few setae on the proximal half, not crowded; the flattened setae in the antero-flexor cilia are straight, not curved.

Paralimna (Paralimna) molosus Schiner

1868. *Paralimna molosus* Schiner, Novara Reise, Zool., II, p. 242. [Venezuela.]
1916. *Paralimna* [(*Paralimna*)] *puncticornis* var. *captiosa* Cresson, Trans. Amer. Ent. Soc., XLII, p. 122. [Trinidad, Bolivia.]
1929. *Paralimna molosus* Cresson, Trans. Amer. Ent. Soc., LV, p. 192. Type designation.
1933. *Paralimna luctans* Cresson, Entom. News, XLIV, p. 66. [Argentina.]

VENEZUELA: Valle Seco, Carabobo, I, (P. Anduze), [Anduze, 2]. San Esteban, XI 26, (P. Anduze), [Anduze, 2]. COLOMBIA: Aracataca, Magdalena, VIII 13, (J. A. G. Rehn; in heavy forest), [ANSP, 1]. Sierra San Lorenzo, (Ujhelyi), [MNH, 2]. BRAZIL: Soa Paulo, (Barbrillini), [Bezzi, 14].

This is the common South American species belonging to a group having a flattened niveous area on the dorsal surface of the second antennal segment. The frontal markings in the present species are obscured cephalad; the face is not extensively discolored; the gray fasciae of the abdomen are slightly dilated mesad; arista with 17 hairs; the antero-flexor cilia of the male fore femur have long normal setae proximad.

Paralimna (Paralimna) puncticornis Cresson

1916. *Paralimna* [(*Paralimna*)] *puncticornis* Cresson, Trans. Amer. Ent. Soc., XLII, p. 121. [Costa Rica, Panama.] [4]
1918. *Paralimna puncticornis* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 47.

HONDURAS: Corocito, IV 3, [Beg, 3]. COSTA RICA: Atirro, III 24, (P. Schild), [Mel, 1]. Higuito, San Mateo, (P. Schild),

[4] The Colombia record under this reference should be referred to *molosus*.

[USNM, 6]. La Suiza, IV 5, VI 23, IX, (P. Schild), [Mel, 4]. La Suiza de Turrialba, (P. Schild), [Mel, 9]. Pedrogosa, (D. L. Rounds), [Mel, 7]. San José, (A. Alfaro), [ANSP, 1]. PANAMA: Barro Colorado, Canal Zone, I 7, 28, XI 21: Corozal, Canal Zone, I 16, 19: France Field, Canol Zone, I 18: (all C. H. Curran), [all AMNH, 6]. Juan Mina, Canal Zone, VIII 28, (R. C. Shannon), [USNM, 1].

This species is similar to *molosus* but the face is mostly brownish; facialia brown, contrasting with the gray bucca; pattern of the frons well developed; antero-flexor cilia of the male fore femur of distinctly modified setae.

Paralimna argyrostoma Cresson

1916. *Paralimna* [(*Paralimna*)] *argyrostoma* Cresson, Trans. Amer. Ent. Soc., XLII, p. 120. [Costa Rica.]

1918. *Paralimna argyrostoma* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 47.

ECUADOR: 1914, (H. A. Parish), [USNM, 1].

A small, light, cinereous species with the brown pattern reduced to almost obliteration; face and clypeus niveous; antennae of male somewhat pale; fore femur of male with modified seta in the antero-flexor cilia.

Paralimna pleurivittata Cresson

1916. *Paralimna* [(*Paralimna*)] *pleurivittata* Cresson, Trans. Amer. Ent. Soc., XLII, p. 122. [Peru.]

The general color of the vestiture in this species is dull yellowish gray or yellowish brown, with the ventral surfaces cinereous; a distinct brown area is present on the mesopleura; the eyes distinctly horizontal in their axis.

Species incertae

Paralimna sticta Hendel, Konowia, IX, p. 127, 1930. [♂, ♀, Argentina.]

From description, this species appears to be related to, or is probably a form of, *molosus* Schiner.

Paralimna bistriata Hendel, Konowia, IX, p. 128, 1930. [♂, ♀, Bolivia.]

Probably related to *secunda* Schiner.

Paralimna cilifera Hendel, Konowia, IX, p. 130, 1930. [♂, ♀, Argentina, Bolivia.]

Apparently similar to *piger* Cresson, or *sana* Cresson. Evidently a member of the *multipunctata* group.

Paralimna appendiculata, Becker (not Loew), Arc. Merid. Equat. Amer. Sud, x, p. 202. [Ecuador.]

Becker records this species from Ecuador, with *P. secunda* Schiner and *P. multipunctata* Williston as synonyms. Whether or not his identifications are correct, I cannot say, but I doubt if *appendiculata* Loew occurs in the Neotropical Zone.

Subgenus **Phaiosterna**

1916. [*Paralimna*] (*Phaiosterna*) Cresson, Trans. Amer. Ent. Soc., XLII, p. 104.

The species of this group are not considered generically distinct from those of *Paralimna sens. strict.* They average smaller, the vestiture is more uniformly brown or olivaceous with no gray and brown pattern nor irrorations. The species, on the whole, resemble those of *Dichaeta.*

Paralimna (Phaiosterna) obscura Williston

1896. *Paralimna obscura* Williston, Trans. Ent. Soc. London, 1896, p. 391. [St. Vincent Island.]
1897. *Paralimna obscura* Williston, Kans. Univ. Quart., VI, p. 5. [Brazil.]
1900. *Paralimna obscura* Coquillett, Proc. U. S. Nat. Mus., XXII, p. 259. [Porto Rico.]
1916. *Paralimna* (*Phaiosterna*) *obscura* Cresson, Trans. Amer. Ent. Soc., XLII, p. 109. [Costa Rica, Cuba, Porto Rico, Brazil, Paraguay.]
1918. *Paralimna* (*Phaiosterna*) *obscura* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 45. [Costa Rica.]
1928. *Paralimna obscura* Curran, Sci. Surv. P. Rico & Virg. Isl., XI, p. 60. [St. Croix.]
1936. *Paralimna obscura* Hendel, Ann. Naturh. Mus. Wien, XLVII, p. 100. [Brazil.]
1938. *Phaiosterna obscura* Cresson, Rev. d. Entom., VIII, p. 32. [Brazil.]

BOLIVIA: Rosario Lake, Rogogua, X–XI, (W. M. Mann), [US NM, 4].

A rather shining species with, at most, faint or abbreviated paler markings on the mesonotum and abdomen.

Paralimna (Phaiosterna) decipiens (Loew)

1878. *Paralimna decipiens* Loew, Zeits. f. Gesam. Naturw., LI, p. 195. [Texas.]

1900. *Paralimna decipiens* Coquillett, Proc. U. S. Nat. Mus., XXII, p. 259. [Porto Rico.]
1916. *Paralimna* (*Phaiosterna*) *decipiens* Cresson, Trans. Amer. Ent. Soc., XLII, p. 108, pl. 9, fig. 5. [Mexico, Guatemala, Costa Rica, Panama, Jamaica, Porto Rico.]
1918. *Paralimna* (*Phaiosterna*) *decipiens* Johnson, Bull. Amer. Mus. Nat. Hist., XLI, p. 446. [Jamaica.]
1923. *Paralimna decipiens* Cole, Proc. Calif. Acad. Sci., (4), XII, p. 478. [Baja, California.]

MEXICO: Tampico, Tam., VII 20, [INHS, 4]; VII 27, (Nabours & Sabrosky Tettigid Exped.), [Sab, 1]; XII 6, (F. C. Bishop), [USNM, 1]. Tamos, VII 28: Topila, VII 31: (Nabours & Sabrosky Tettigid Exped.), [Sab, 2]. HONDURAS: Puerto Castilla, V 25–28, (R. H. Painter), [Paint, 6]. CUBA: Havana, (C. F. Baker), [USNM, 1], Soledad Cienfuegos, I–II, (C. T. & B. B. Brues), [Mel, 9].

This species is distinguished from *obscura* by the more opaque surfaces of the mesonotum and abdomen. The former shows some vittation and the latter has olivaceous fasciae.

Tribe NOTIPHILINI

1946. Notiphilini Cresson, Trans. Amer. Ent. Soc., LXXII, p. 228.

NOTIPHILA

1913. *Notiphila* Fallen, K. Svenska Vet.-Akad., Handl., 1813, p. 248.

The Neotropical species of this genus are not comparatively well represented in collections I have seen, and the series of most of them are small.

Subgenus **Agrolimna**

1917. [*Notiphila*] (*Agrolimna*) Cresson, Trans. Amer. Ent. Soc., XLIII, p. 48.

Notiphila (Agrolimna) triangulifera Schiner

1868. *Notiphila triangulifera* Schiner, Reise Novara, Zool., II, abt. 1, Dipt., p. 241. [Venezuela.]
1919. *Notiphila uliginosa* Becker (not Fallen), Arc. Merid. Equat. Amer. Sud, x, p. 201. [Ecuador.]

I have seen only two specimens, a male and female, of this species, and these were in the collection of the Vienna National Museum. The female, labeled (1) "Lindig. 1864. Venezuela," (2)

"triangulifera Alte Sammlung," I have selected as, and labeled, "TYPE." This specimen was selected as agreeing better with the original description. The other is a male and was labeled "ALLOTYPE" and is no doubt conspecific with the female type, but the abdomen "an der Basis des dritten bis fumften Ringes mit je zwei grossen schwarzen dreickigen Flecken" does not apply so well.

On the comparison of these specimens with those of the European *uliginosa,* very little of apparent specific importance can be found. I cannot give any more definite opinion as to the status of this form without more material at hand.

It is the only species having black palpi, known to me occurring in this region. No doubt Becker's 1919 record is of this species.

Notiphila (Agrolimna) furcata (Coquillett)

1902. *Dichaeta furcata* Coquillett, Jour. N. Y. Ent. Soc., x, p. 182. [Florida.]
1917. *Notiphila* [(*Agrolimna*)] *furcata* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 59, pl. 3, fig. 6.
1928. *Notiphila furcata* Curran, Sci. Surv. P. Rico & Virg. Isl., XI, (1), p. 59. [Porto Rico.]

PUERTO RICO: San Juan, II 11–14; Ensenada, VI 14–19; [AM NH, 10].

These specimens are part of the series recorded by Curran (1928).

Notiphila (Agrolimna) frontalis Coquillett

1897. *Notiphila pulchrifrons* Williston not Loew, Kans. Univ. Quart., VI, p. 5. [Brazil.]
1904. *Notiphila frontalis* Coquillett, Proc. Ent. Soc. Wash., VI, p. 97. [Nicaragua.]
1917. *Notiphila* [(*Agrolimna*)] *frontalis* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 56. [Costa Rica.]

COSTA RICA: Pedregoso, (D. L. Rounds), [Mel, 1]. San José, VIII, (H. Schmidt), [USNM, 1]. MEXICO: Ocosingo, Chiapas, 3000 ft. alt., I 24 (D. W. Amrama, Jr.), [ANSP, 5]. GUATEMALA: Guatemala City, IV 10; Antigua, IV 2; El Salto, Antigua, V 1; (J. M. Aldrich), [USNM, 8].

This is the Neotropical, and more intensely marked, representative of the northern *pulchripes* Loew.

Subgenus **Notiphila**

1917. [*Notiphila*] (*Notiphila*) Cresson, Trans. Amer. Ent. Soc., XLIII, p. 31.

Notiphila (Notiphila) virgata Coquillett

1900. *Notiphila virgata* Coquillett, Proc. U. S. Nat. Mus., XXII, p. 259. [Porto Rico.]
1917. *Notiphila* [(*Notiphila*)] *virgata* Cresson in part, Trans. Amer. Ent. Soc., XLIII, p. 40, pl. 1, figs. 1, 2, 3. [San Domingo, Porto Rico, Martinique.]
1928. *Notiphila virgata* Curran, Sci. Surv. P. Rico & Virg. Isl., XI; (1), p. 59. [Porto Rico.]

Very similar to *striata* but the face usually lacks the median stripe; it is also broader and the facials are stronger, in shorter series. It may be merely the West Indian subspecies of *striata*. In the above characters this form differs from the Costa Rican individuals of *striata* and my 1917 citations for *virgata* should not include the Costa Rica records.

Notiphila (Notiphila) striata Williston

1897. *Notiphila striata* Williston, Kans. Univ. Quart., VI, p. 5. [Brazil.]
1912. *Notiphila stricta* Grossbeck, Bull. Amer. Mus. Nat. Hist., XXXI, p. 378. Error for *striata*.
1917. *Notiphila striata* Cresson, Trans. Amer. Ent. Soc., XLIII, pp. 41, 62.
1917. *Notiphila* [(*Notiphila*)] *facialis* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 38. [Panama, Brazil, Paraguay.]
1917. *Notiphila virgata* Cresson in part not Coquillett, Trans. Amer. Ent. Soc., XLIII, p. 40. [Costa Rica and Guatemala records only.]
1918. *Notiphila virgata* Cresson not Coquillett, Trans. Amer. Ent. Soc., XLIV, p. 44. [Costa Rica.]
1938. *Notiphila striata* Cresson, Rev. de Entom., VIII, p. 32. [Brazil.]

GUATEMALA: Antigua, IV 2; La Providencia, V 14, 16; San Cristobal, Alta Vera Paz, V 17; (all J. M. Aldrich), [all USNM, 7]. COSTA RICA: La Suiza de Turrialba, VI–VII, (P. Shild); Pedregoso, (D. L. Rounds); [all Mel, 6]. San José, VII, (H. Schmidt), [USNM, 1]. ECUADOR: Baños, II 20, (S. W. Frost), [Frost, 8]. BRAZIL: São Paulo, (Barbellini); San Sebastino, (Barbellini); [all ANSP, 3].

Notiphila (Notiphila) erythrocera Loew

1878. *Notiphila erythrocera* Loew, Zeits. f. Gesam. Naturw., LI, p. 194. [Cuba.]

1885. *Notiphila erythrocera* Roeder, Stet. Ent. Zeitung, 1885, p. 349. [Porto Rico.]
1896. *Notiphila bellula* Williston, Trans. Ent. Soc. London, 1896, p. 390. [St. Vincent Island.]
1897. *Notiphila bellula* Williston, Kans. Univ. Quart., VI, p. 5. [Brazil.]
1917. *Notiphila* [(*Notiphila*)] *punctifera* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 34. [Brazil.]
1917. *Notiphila* [(*Notiphila*)] *erythrocera* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 36. [Cuba, Mexico, Guatemala, Nicaragua, Colombia.]
1917. *Notiphila* [(*Notiphila*)] *virgata* var. *pura* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 41. [Panama.]
1917. *Notiphila bellula* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 61. Unrecognizable.
1918. *Notiphila erythrocera* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 43. [Costa Rica.]
1919. *Notiphila rubricornis* Becker, Miss. Arc. Meridien Amer. Sud, XI, p. 201. [Ecuador.]
1938. *Notiphila erythrocera* Cresson, Rev. de Entom., VIII, p. 32. [Brazil.]

MEXICO: Tamos, VII 29; Topila, VII 31, (Nabours & Sabrosky), [NSTE, 4]. Mexico City, (J. Muller), [USNM, 1]. Cuernavaca, XI, (E. G. Smyth), [USNM, 1]. GUATEMALA: La Providencia, Obispo, IV 16, (J. M. Aldrich), [USNM, 1]. PANAMA: La Chorrera, V 22, (A. Busck), [USNM, 1]. Ancon, Canal Zone, IV 22, (C. T. Greene), [USNM, 1]. CUBA: Cabanas, Pinar del Rio, IX 5–8; Pinar del Rio, IX 9; [AMNH, 2].

As here considered, this is an extremely variable species, and may comprise several distinct forms which my relatively small series will not allow me to distinguish. Some of the above cited synonyms may prove to be one or more of these forms; *bellula, punctifera* and *virgata* var. *pura* seem to be merely forms with recessive maculation, while *rubricornis* is probably a true synonym.

The salient features of this species are the general ochraceous (typical) vestiture variegated with brown stripes, spots and irrorations, which, however, may be absent, faint, or confined to the irrorations; the pale antennae and tibiae, relatively strong but few (1–3) facials; the scutellum at most, with small dark lateral stripes.

It is similar to *virgata* in many respects but lacks the conspicuous velvety black lateral margins of the scutellum and the mesonotum is less distinctly vittate.

Notiphila (Notiphila) teres Cresson

1931. *Notiphila teres* Cresson, Dipt. Pat. & So. Chile, VI, p. 97. [Chile.]

ARGENTINA: San Isidro, Buenos Aires, I 10 (F. W. Edwards), [BM, 1]. Ceres, I 12, (C. J. Drake). URUGUAY: Montevideo, Uruguay, to Salto & Concordia, Argentina, III, 6–14, (J. L. Parker; sweeping and at light), [USNM, 26].

Very similar to *erythrocera,* but the frons, face and cheeks are somewhat broader, and the frons in profile is more prominent; the aristal hairs are less in number. It is possible that this may be *Notiphila exotica* Wiedeman described from Montevideo.

Notiphila (Notiphila) ancudensis Cresson

1931. *Notiphila ancudensis* Cresson, Dipt. Pat. & So. Chile, VI, p. 98. [Chile.]

Very similar to *teres* Cresson, but the abdomen is immaculate.

Species incertae

Notiphila alboclavata Bigot, Miss. Sci. Cap Horn, Dipt., VI, p. 41, 1888. [Cape Horn.] Cresson, Trans. Amer. Ent. Soc., XLIII, p. 61, 1917.

Probably not a member of the genus.

Notiphila brasilliensis Walker, Dipt. Saund., I, p. 408, 1856. [Brazil.] Cresson, Trans. Amer. Ent. Soc., XLIII, p. 61, 1917.

Certainly not a *Notiphila.*

Notiphila costalis Walker, Dipt. Saund., I, p. 408, 1856. [Brazil.] Cresson, Trans. Amer. Ent. Soc., XLIII, p. 61, 1917.

Another species of doubtful assignment.

Notiphila difficilis Wiedeman, Aussereur. Zweifl. Ins., II, p. 591, 1830. [South America.] Cresson, Trans. Amer. Ent. Soc., XLIII, p. 62, 1917.

This is possibly *erythrocera.*

Notiphila exotica Wiedeman, Aussereur. Zweifl. Ins., II, p. 590, 1830. [Montevideo.] Cresson, Trans. Amer. Ent. Soc., XLIII, p. 62, 1917.

Probably one of the forms of *erythrocera,* or may be *N. teres* Cresson.

Key to the Neotropical Species of Notiphila

1. Palpi black.....**triangulifera** Schiner
   Palpi pale (yellow).....2
2. Apical extensor on mid tibia minute or absent; facials few and usually strong, the series confined to lower part of facialia (Subgenus *Notiphila*).....4
   Apical extensor present and strong; facials usually hair-like, in series extending well onto upper part of facialia (Subgenus *Agrolimna*)..3
3. Frontalia black and mesonotum conspicuously brown vittate; antennae pale.....**pulchrifrons** Williston
   Frontalia overcast with ochraceous vestiture; antenna II black; marginal setae on tergite IV very long and V of male with two long stout bristles.....**furcata** Coquillett
4. Lateral surfaces of scutellum wholly opaque black in extreme caudal aspect.....**striata** Williston
   Scutellum with only a lateral ventral black stripe.....5
5. Arista with eight to ten hairs.....**teres** Cresson
   ancudensis Cresson
   Arista with twelve to fourteen hairs.....**erythrocera** Loew

Tribe Typopsilopini

TYPOPSILOPA

1916. *Typopsilopa* Cresson, Entom. News, xxvii, p. 147.

The species of this genus may be readily mistaken for those of *Psilopa,* but here we have well-developed dorsocentrals.

Typopsilopa atra (Loew)

1862. *Psilopa atra* Loew, Monogr. Dipt. No. Amer., i, p. 143. [United States.]

1916. *Typopsilopa atra* Cresson, Entom. News, xxvii, p. 147.

Guatemala: Ingenio Railroad Station, IV 28, (J. M. Aldrich), [USNM, 1]. Costa Rica: San José, V 16, (H. Schmidt), [USNM, 1].

Chiefly a Nearctic species, the above records being of the only material seen from below the Mexican border of the United States.

In comparison with the more common *flavitarsis, atra* has the facial setae situated nearer the epistomal margin, much nearer than their distance apart. The fore and mid tarsi are entirely black.

Typopsilopa flavitarsis Cresson

1916. *Typopsilopa flavitarsis* Cresson, Entom. News, xxvii, p. 147. [Arizona.]

1918. *Typopsilopa flavitarsis* Cresson, Trans. Amer. Ent. Soc., XLIV, p. 53, pl. 3, fig. 7. [Costa Rica.]
1928. *Typopsilopa flavitarsis* Curran, Sci. Surv. P. Rico & Virg. Isl., XI, (1), p. 61. [Porto Rico.]

MEXICO: La Balsa, X 17, [USNM, 2]. PANAMA: Taboga Island, II 26, (A. Busck), [USNM, 1]. BRITISH GUIANA: Bartica, V 11, (R. J. Crew), [ANSP, 1]. Georgetown Experiment Station (F. A. Squire; bred, I 8–9, from rice stool), [IIE, 2]. BRAZIL: Gavea, Rio de Janeiro, III 29, VI 29, (H. Sousa Lopez), [IBV, 7]. PARAGUAY: Asuncion, V, (Vezemyi), [M NH, 1]. San Bernardino, (Babarczy), [MNH, 5]: (K. Fiebrig), [Vienna].

A slightly larger species than *atra,* with all tarsi pale, and the facials are situated higher, midway between the antenna and epistoma, about as far above the latter as their distance apart.

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NEW EASTERN AMERICAN SPECIES OF PODABRUS

(COLEOPTERA: CANTHARIDAE)

BY JOHN WAGENER GREEN

Easton, Pennsylvania

(Text-figures)

Two rather abundant and widely distributed eastern species of *Podabrus,* allied respectively to *diadema* and *modestus,* escaped detection by Fall and others who have studied the genus, and are still without names. Descriptions of these, and of three other apparently rare eastern *Podabrus,* are here presented.

In the terminology adopted, the abdominal sternites are numbered to correspond with their tergites, beginning at the base of the abdomen. Tergite 1 having no visible sternite, the first sternite will therefore be number 2. In the males of many species of *Podabrus* sternite 7 is membraneous medially in a large triangular area having its base on the apical margin of the sternite. This structure is very prominent in some species and is scarcely evident or absent in others. Where a dual system of vestiture occurs, the longer and more conspicuous pubescence is designated the primary, and the minute hairs the secondary pubescence. The vestiture of the legs differs specifically, and sometimes sexually, and provides a useful taxonomic character. The shape of the pronotum in *Podabrus,* as in other cantharids, is quite unstable. Small differences in conformation and punctation are consequently of no value in the discrimination of species. For each species, however, the pronotum adheres with sufficient closeness to a general and recognizable plan.

The accompanying genitalic drawings do not show, except briefly from a lateral viewpoint, the median lobe of the aedeagus, nor the long hairs fringing the apex and notch of the dorsal plate.

Removal of the male genitalia of most cantharids is easily accomplished, after thoroughly relaxing the specimen, by squeezing the tip of the abdomen with a fine forceps and gradually forcing out the genital segment. Specimens that have been treated in hardening liquids cannot be manipulated in this way, and very old specimens are sometimes recalcitrant and require some prying with the dissecting needle.

The author is indebted to Dr. C. S. Brimley, Dr. Henry Dietrich, and Mr. R. R. Dreisbach, from each of whom a new *Podabrus* was received; and to Mr. C. A. Frost, who very generously compared the types of *Podabrus brimleyi* with Leconte's type of *P. fissus,* and for the loan of paratypes of *P. frosti.*

Mention of Mr. Fall's study of *Podabrus* in the following pages refers to his review of the North American species in Entomologica Americana, volume 8, 1927, pages 65 to 103.

Podabrus frosti Fender (Text-fig. 8.)

A male example of this species from McLean, New York, located in the Cornell University collection and received for study from Dr. Dietrich, lacks the pale elytral margins of typical specimens, only the extreme lateral margin being pale in basal half as in *P. frater.* Comparison was made with two paratypes of *frosti,* kindly loaned by Mr. C. A. Frost, resulting in the positive assignment of the McLean specimen to this species. The McLean specimen also differs in having the antennae brownish piceous with the joints only very faintly paler at base, the legs entirely piceous with the trochanters pale, and the pronotum piceous with the explanate sides and narrow apical and basal borders pale yellow. In both the McLean specimen and the two paratypes the second antennal joint is perceptibly shorter than the third. The apical dilation of the protibiae varies from a simple widening of the tibia to a pronounced though not sharply marked angulation. On comparing the above remarks with Fender's description * it will be seen that nothing very definite remains for separating *frosti* from *knobeli.* The male genitalia, however, effectively demonstrate the validity of *frosti* (figs. 8 and 9). *Podabrus frater* differs from both *knobeli* and *frosti* in having a dense brush of long erect hairs internally on

* Bull. Brook. Ent. Soc., 1946, XLI, p. 12.

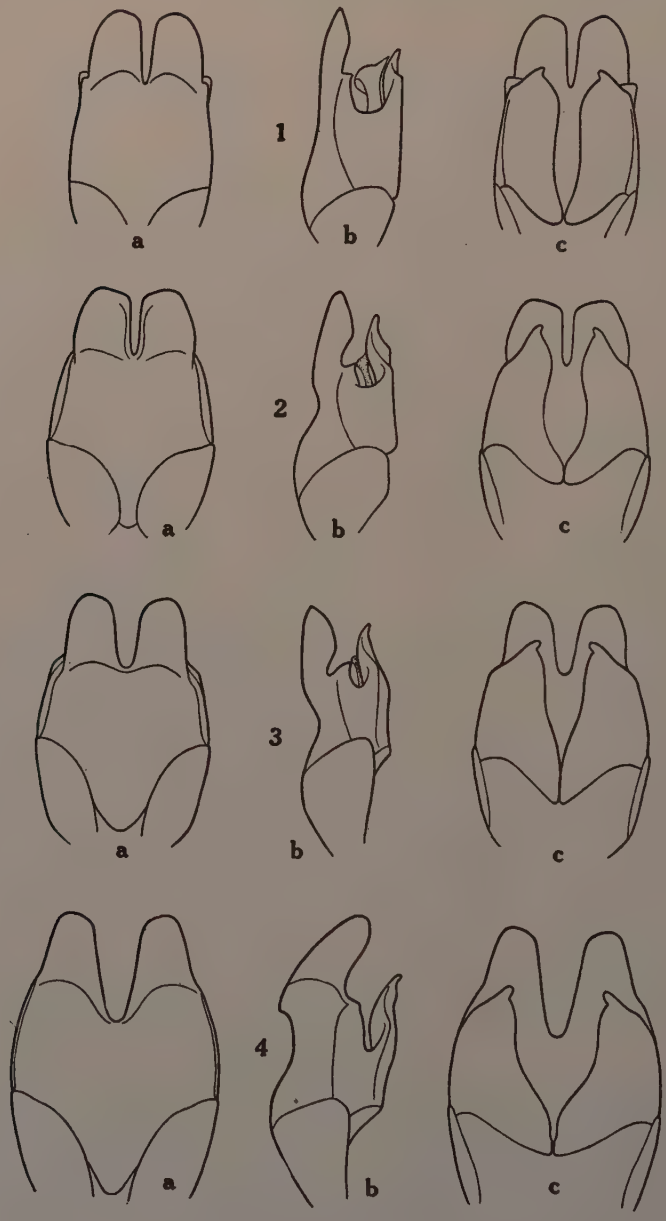
apical three-fourths of the male mesotibiae. In the males of all three species abdominal sternite 7 has a very pronounced median membraneous area.

Podabrus planulus new species (Text-fig. 1.)

Head black posteriorly, brownish yellow in front of the eyes, apical border of clypeus black or piceous; antennae black, only the extreme base of first joint pale; palpi black, fuscous basally. Pronotum brownish yellow (red in living specimens), the explanate lateral borders paler, disk with a large transverse apical piceous spot and a smaller transverse basal spot, the two spots usually more or less broadly confluent medially. Scutellum and mesonotum black. Elytra totally black, the lateral bead not in the least paler toward base. Body beneath black, prothorax and front half of head pale, legs and coxae black. Length 8.5–12 mm.

MALE.—Head across the eyes slightly wider than pronotum, the black area somewhat shining and rugosely but not coarsely punctate, alutaceous sculpture evident; epicranium beneath smooth and shining anteriorly, punctate posteriorly as on upper surface. Antennae slender, two-thirds as long as the body, first six joints feebly obconic, last five cylindric, second somewhat more than half as long as third, median joints about four times as long as wide. Terminal joint of maxillary palpi rather broadly triangular, the apex not longer than the inner side. Pronotum subrectangular, one-third wider than long, widest at middle, lateral margins broadly rounding into the obsolete front angles, feebly converging to base, distinctly sinuate before the dentiform hind angles; surface smooth and shining, minutely and sparsely punctulate, without median impressed line; sides not very widely explanate and not at all reflexed, the surface at the hind angles flat and not concave. Elytra finely and rather densely rugulose, more coarsely toward apex; pubescence short, cinereous, much inclined or recumbent. Abdomen shining, with fine irregular transverse wrinkles; secondary pubescence extremely minute, not evident laterally; sternite 7 with apical membraneous area indistinct; sternite 8 with thickened and rounded apical angles each side of the broadly truncate and shallow median emargination. Legs slender, clothed throughout with short pubescence which is not erect or bristling at any point; protibiae and metacoxae not sexually modified; protarsal claws very narrowly cleft, the tooth stouter than the apical part and of equal length; other claws similar to protarsal but more widely cleft and with the tooth shorter than the apical part.

FEMALE.—Eyes smaller, head scarcely wider than pronotum; antennae shorter, about half as long as the body, the joints feebly obconic, second three-fourths as long as third. Abdominal sternite 8 slightly produced at tip and with a small triangular apical notch; secondary pubescence median only, very sparse and minute. Claws widely cleft, the tooth stouter and shorter than the apical part.



Male genitalia. The letters a, b and c signify, respectively, dorsal, lateral and ventral aspects. Fig. 1.—*Podabrus planulus* new species. Fig. 2.—*Podabrus diadema* Fab. Fig. 3.—*Podabrus intrusus* new species. Fig. 4.—*Podabrus modestus* Say.

Holotype.—Male; Wind Gap, Pennsylvania, V–31–44, collected by J. W. Green; located in author's collection.

Allotype.—Female, same data as holotype.

Paratypes.—36 males and 50 females from the following localities:

MAINE: Paris. NEW HAMPSHIRE: Enfield. MASSACHUSETTS: Framingham; Monterey. NEW YORK: Upper Saranac; Albany; Poestenkill; Mt. Marcy; Ithaca; Rock City; Cold Brook; McLean; Oliveria; Gainesville; Labrador Lake; Heart Lake. PENNSYLVANIA: Wind Gap; Mt. Pocono. MICHIGAN: Lapeer Co.

Dates of capture range from May 13 to July 12.

Podabrus planulus is found in most collections mixed with *P. diadema* (fig. 2) and has about the same range of distribution. *Diadema* differs greatly in the concave hind angles of the pronotum with the sides at that point distinctly reflexed. The terminal joint of the maxillary palpi in *diadema* is more elongate and less plainly triangular, with the apex considerably longer than the inner side. The elytral pubescence of *diadema* is distinctly longer and sparser. Certain apparently inconsequential color characters are comparatively constant and some or all of them can always be depended on to separate the two species. The clypeus in *diadema* is fuscous or pale throughout, lacking the dark apical border of *planulus*. The base of the antennae in *diadema* is more extensively pale. The pronotum of *diadema* varies from entirely pale to entirely black, but never has the characteristic transverse apical and basal spots of *planulus*. The elytra in *diadema* are not totally black but have the marginal bead perceptibly paler toward base.

Malthacus parvicollis Mots., from Pennsylvania, is listed as a synonym of *Podabrus diadema*. It is described as having the knees and tarsi yellowish, a condition that definitely would not apply to any known examples of either *diadema* or *planulus*.

Podabrus intrusus new species (Text-fig. 3.)

Head black posteriorly, pale reddish yellow in front of the eyes; antennae black or piceous, the two basal joints paler, the second infuscate above; palpi piceous, paler at base. Pronotum brownish piceous medially, the explanate lateral borders pale reddish yellow, varying with the entire pronotum pale; scutellum and mesonotum piceous black. Elytra piceous black, sutural margin very narrowly pale, the pale area terminating at the tip of the scutellum and

not expanding at any point; apex and lateral margin similarly narrowly pale, the pale area slightly wider basally but not completely covering the inflexed part of the elytra. Body beneath piceous black, prothorax and front half of head pale. Legs fusco-piceous varying to black; trochanters, coxae in part, and base of femora pale; rarely the legs are entirely pale. Length 8.5–11 mm.

MALE.—Head across the eyes distinctly wider than pronotum, the black area shining, with evident alutaceous sculpture, rugosely and rather coarsely punctate, more coarsely and densely posteriorly. Antennae slender, seven-tenths as long as the body, the joints beyond the third subcylindric, third perceptibly longer than second, median joints about three and one-half times as long as wide. Terminal joint of maxillary palpi elongate triangular, apical and inner sides subequal. Pronotum subrectangular, three-tenths wider than long, widest at middle, lateral margins broadly rounding into the nearly obsolete front angles, feebly converging to base, not sinuate before the dentiform hind angles; surface smooth and shining, minutely and sparsely punctulate, median line feebly impressed or absent; sides not very widely explanate, not reflexed except at the concave hind angles. Elytra finely and densely rugulose, more coarsely toward apex, nearly smooth basally; pubescence cinereous, inclined, more erect toward apex. Abdomen feebly shining, without transverse wrinkles; secondary pubescence evenly distributed throughout; sternite 7 with distinct triangular membraneous area; sternite 8 with the usual broad and shallow emargination, the rounded apical angles scarcely thickened. Legs slender, the pubescence short throughout, not erect or bristling at any point; protibiae and metacoxae not sexually modified; protarsal claws rather narrowly cleft, the tooth shorter and stouter than the apical part, other claws similar but more widely cleft.

FEMALE.—Eyes smaller, head scarcely as wide as pronotum; antennae shorter, about half as long as the body, the joints feebly obconic, second and third of equal length or nearly so. Sternite 8 slightly produced at tip and with a small triangular median notch. Claws widely cleft, the tooth shorter and stouter than the apical part.

Holotype.—Male; Effort, Pennsylvania, VI–18–32, collected by J. W. Green; located in author's collection.

Allotype.—Female; same data as holotype.

Paratypes.—46 males and 65 females from the following localities:

MAINE: Paris. VERMONT: Queechee. MASSACHUSETTS: Sherborn; Hopkinton; Sudbury; Natick; Mt. Tom. NEW YORK: Upper Saranac; Bear Mt.; Ft. Montgomery; Altamont; Clarksville; Albany; Northville; Raders Mills; Ithaca; Barnum Pond; Artists Brook; Olcott; Bolton; Underwood; Shelby; Peru; Mt. Whiteface, 2000 ft.; Heart Lake; Elmira; Salem; Hyde Park. PENNSYLVANIA: Effort; Mt. Pocono; Pocono Lake; Stroudsburg;

Easton; Wind Gap. NEW JERSEY: Phillipsburg. MICHIGAN: Saginaw Co.

Dates of capture range from May 19 to July 12.

Fall included *Podabrus intrusus* with *P. modestus* (fig. 4), stating that the legs vary from entirely pale (*modestus*) to piceous, the femora in the latter case diffusely pale only at the extreme base (*intrusus*). After removing *intrusus* and another form mentioned below, *modestus* is seen to be of consistently uniform appearance, not varying any more than is normal for the species of *Podabrus*. *Intrusus* is readily distinguished from *modestus* by the very narrow pale margins of the elytra, with the pale sutural margin terminating at the tip of the scutellum. In *modestus* the pale sutural border expands toward base and always envelops the scutellum, sometimes even attaining the humeri. The color of the legs is not dependable for separating the two species. In some exceptional specimens of *modestus* the legs are nearly as dark as in typical *intrusus*, and occasionally the legs in *intrusus* are entirely pale. The second antennal joint in *modestus* is not shorter than the third in either sex, whereas in *intrusus* the second joint is distinctly shorter than the third in the male, sometimes also in the female.

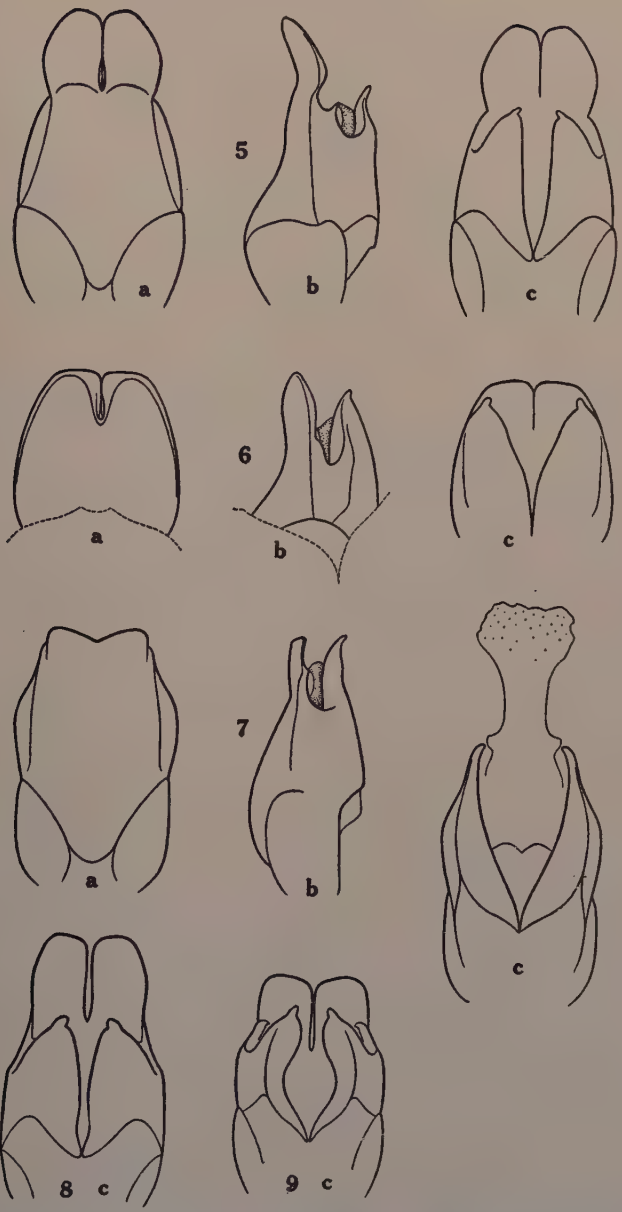
In all collections examined a large proportion of the specimens classed as *modestus* are females that can properly be assigned to neither *modestus* nor *intrusus*. No corresponding males have ever been seen, so the true status of this form cannot be determined. The size averages greater than in either *modestus* or *intrusus;* the color is nearly as in *intrusus*, with dark legs but with the sutural pale area obscurely enveloping the scutellum somewhat as in *modestus*. Unlike either *modestus* or *intrusus*, the ventral surface of the head is rufous posteriorly, usually leaving only a small dusky cloud on either side of the gula and immediately behind the maxillae. The rufous area often extends laterally behind the eyes and may then be seen from above. Structurally this doubtful form of *modestus* differs in having the pronotum rather strongly transverse, more coarsely punctate, and with quite prominent basal callosities on either side of the more or less distinct median impressed line. The second antennal joint is usually perceptibly shorter than the third. In some respects this form ap-

proaches *punctulatus*. In female *punctulatus,* however, the antennae are much shorter and stouter, with the second joint decidedly shorter than the third; and the impressed median line of the pronotum is rather strongly eroded.

Podabrus brimleyi new species (Text-fig. 5.)

Head reddish yellow, black behind the antennae except a large central reddish yellow spot occupying most of the surface; antennae black, the extreme base of each of the first two joints pale; palpi fuscous, paler at base. Pronotum reddish yellow with a central longitudinal black spot nearly attaining the base but not the apex. Scutellum black, the tip pale; mesonotum pale. Elytra black; sutural margin narrowly reddish yellow, the pale color reaching the scutellum but not extending distinctly around it; apical and side margins similarly narrowly pale. Head and prothorax beneath entirely reddish yellow, balance of ventral surface black with the mesosternum medially and the two apical sternites pale. Legs black; basal half of femora, coxae, and trochanters pale, the metacoxae black externally; tarsi piceous with the segments paler at base. Length 8.5–11.5 mm.

MALE.—Head scarcely as wide as the pronotum, eyes rather small; surface smooth and shining, sparsely and rather finely punctate, alutaceous sculpture apparent only between the antennae, occiput coarsely, confluently, and rugosely punctate; epicranium beneath smooth and impunctate in front, obliquely wrinkled medially, coarsely and densely rugose posteriorly. Antennae slender, two-thirds as long as the body, the joints feebly obconic, second slightly shorter than third, median joints about three and one-half times as long as wide. Terminal joint of maxillary palpi triangular, the apex distinctly shorter than the inner side. Pronotum subrectangular, one-third wider than long, a little narrowed in front, very feebly so behind; front angles rounded, defined by a shorter radius of curvature, hind angles very minutely dentiform, the lateral margin not sinuate before them; surface shining, irregularly and somewhat coarsely punctate toward the middle of the base and near the apical angles, elsewhere the punctures are finer and sparser; median impressed line distinct in basal punctate area; sides rather broadly explanate, slightly reflexed anteriorly and more distinctly so at the concave hind angles. Elytra shining, coarsely rugose, smoother and more shining toward base; pubescence short, sparse, inclined. Abdomen dull, the transverse wrinkles very feeble; secondary pubescence dense and conspicuous throughout; sternite 7 with well-defined membraneous triangular area; sternite 8 broadly but very shallowly emarginate and with the apical angles somewhat thickened. Legs slender, clothed rather sparsely with short pubescence, somewhat bristling on the tibiae; finer, denser, and more erect on the inner side of the tibiae toward apex; protibiae and metacoxae not sexually modified; protarsal claws narrowly cleft, the tooth stouter than the apical part and a little shorter; other claws nearly the same, slightly more widely cleft and with the tooth still shorter, this more apparent in the metatarsal claws.



Male genitalia. The letters a, b and c signify, respectively, dorsal, lateral and ventral aspects. Fig. 5.—*Podabrus brimleyi* new species. Fig. 6.—*Podabrus dreisbachi* new species. Fig. 7.—*Podabrus dietrichi* new species. Fig. 8.—*Podabrus frosti* Fender. Fig. 9.—*Podabrus knobeli* Fall, also *Podabrus frater* Lec.

FEMALE.—Eyes smaller, head very plainly narrower than the pronotum; black area extending in front of the antennae partly on the clypeus. Antennae short, less than half as long as the body, second and third joints of nearly equal length, median joints about two and one-half times as long as wide. Pronotum one-half wider than long, without median dark spot. Scutellum and mesonotum pale. Elytra rather finely and densely rugulose, the pubescence more plentiful. Abdomen entirely black; sternite 8 abruptly produced medially at apex in two small triangular processes, the intervening triangular notch deeper than the length of the processes. Tibial vestiture unmodified; claws widely cleft, the tooth scarcely stouter than the apical part but much shorter.

Holotype.—Male; Wilmington, North Carolina, V–5–40, collected by D. L. Wray; located in author's collection.

Allotype.—Female; same data as holotype.

Two specimens only of *P. brimleyi* have been seen. They were received from Dr. C. S. Brimley, in whose honor the species is named. In Fall's table *brimleyi* would key to the vicinity of *fissus, basilaris,* and *punctulatus,* but it does not seem to be closely related to any of them, with the possible exception of *fissus.*

Podabrus fissus Lec.

Mr. Fall having suggested the possibility that Leconte's type of *fissus* might be an abnormal specimen, no doubt because of its unusual pronotal sculpture, it seemed advisable to make a comparison between the types of *fissus* and *brimleyi.* This comparison was very kindly made by Mr. C. A. Frost, who reported that *fissus* and *brimleyi* are, in his opinion, definitely not conspecific, and moreover that there is apparently nothing about the type of *fissus* suggesting abnormality.

Mr. Frost stated that *fissus* differs from *brimleyi* in having the head distinctly wider than the pronotum, pale in front and dark behind the middle of the eyes, the dark area more densely punctate and without a central pale spot, smoother and not wrinkled beneath; the terminal joint of the maxillary palpi with the apex longer than the inner side; the antennae shorter; the pronotum entirely dull in luster, with a large reddish brown discal area closely and rather coarsely punctate, somewhat as in *punctatus* but denser, the lateral margin sinuate before the more prominent dentiform hind angles, the sides less widely explanate; the elytra more densely pubescent and duller; the tibial vestiture not of uniform

length, longer and denser; the palpi and legs fuscous, the latter only slightly paler at base and gradually darker to and including the tibiae; and the posterior trochanters dull and apparently densely punctate. This information is presented here because of its value in identifying Leconte's species, which is still known only by the single type specimen.

Podabrus dreisbachi new species (Text-fig. 6.)

Head pale yellow except a subtriangular piceous spot with its apex attaining the occiput and its base extending between the eyes in a trilobed pattern; sides of occiput piceous. Antennae beneath pale throughout, upper side of first joint with a small dark spot near apex, second joint with a fuscous stripe, following joints fuscous but becoming progressively paler to tip of antenna. Palpi pale, slightly darker at tip. Pronotum fusco-piceous medially, sides broadly pale yellow. Scutellum pale. Elytra fusco-piceous with a broadly pale sutural area expanding at base to include the humeri and narrowing to apex; tip of elytra rather broadly, and lateral margin narrowly, pale, the latter widening at base to cover inflexed portion of elytra. Head and prothorax entirely pale beneath, except the posterior border of the occiput; balance of ventral surface piceous, the abdominal sternites with narrow lateral and apical pale borders, the last two sternites and most of the preceding one pale. Legs and coxae pale, the metacoxae dark externally. Length 9.5 mm.

MALE.—Head slightly wider than pronotum, shining, without alutaceous sculpture, coarsely and rather densely rugosely punctate between and behind the eyes; epicranium beneath smooth and shining anteriorly, sparsely punctate medially, coarsely and densely rugose-punctate posteriorly. Antennae slender, two-thirds as long as the body, the joints feebly obconic but more nearly cylindric toward tip of antenna, second almost as long as third, median joints about four times as long as wide. Terminal joint of maxillary palpi triangular but rather slender, the apex longer than the inner side. Pronotum subrectangular, one-third wider than long, widest at middle, lateral margins rounding into the scarcely apparent front angles, feebly converging to base, not sinuate before the minutely dentiform hind angles; surface shining, rather densely but not coarsely punctate in front of the prominent callosities, elsewhere more finely and sparsely punctate; median line finely and sharply impressed between the callosities; sides rather broadly explanate, not reflexed anteriorly, distinctly reflexed toward base, the hind angles deeply concave. Elytra finely rugulose basally, more coarsely toward apex; vestiture consisting of shorter and more recumbent cinereous hairs intermixed with others that are longer and suberect, the latter plentiful toward apex. Abdomen dull, transverse wrinkles scarcely evident, secondary pubescence dense and evenly distributed; sternite 7 apparently without membraneous area; sternite 8 scarcely emarginate, the apical angles only feebly thickened.

Legs slender, pubescence short and not erect or bristling except externally on the protibiae, where the hairs are a little finer, denser, and more erect; protibiae nearly straight externally, internally widening slightly from base to near apical third, the widest point, thence straight and narrowing a little to apex, the entire modification extremely feeble; metacoxae not sexually modified. Protarsal claws with a stout acute tooth slightly shorter than the slender apical part and contiguous with it basally but with the tips widely separated; other claws similar, the tooth shorter and very stout.

Type.—Male; Midland County, Michigan, VI–12–37, collected by R. R. Dreisbach; located in author's collection.

The type and only specimen known was received from Mr. R. R. Dreisbach, of Midland, Michigan, in whose honor the species is named. It keys in Fall's table to the *basilaris-punctulatus* couplet, but would be more correctly associated with *P. tomentosus,* having nearly similar ungual structure and male genitalia of the same general type. *Tomentosus,* however, has very stout antennae and legs, with the male protibiae strongly modified, besides differing in so many other particulars that in habitus it is totally dissimilar.

Podabrus punctatus Lec.

A single male from Ithaca, New York, in the Cornell University collection, received through the courtesy of Dr. Henry Dietrich, differs from typical *punctatus* in having the pronotum black with the explanate area at the anterior angles dark rufous. In the typical form the pronotum is entirely red or reddish yellow, and no variations from that plan have been reported. The Ithaca specimen agrees so completely, except in color, with typical *punctatus* that it seems improbable that it could represent a distinct species. Certain differences in the genitalia are noted, but these could be caused by immaturity and consequent distortion in drying.

Podabrus dietrichi new species (Text-fig. 7.)

Head black posteriorly, front half, including antennal prominences, yellow, the clypeus scarcely darker at apex; antennae black, first joint yellow with piceous cloud on upper surface, second joint dark piceous, yellow beneath; maxillary palpi yellow, narrowly piceous at tip, the labial palpi considerably darker. Pronotum yellow, narrowly and nubilously piceous along median half of apical border. Scutellum black, mesonotum piceous. Elytra entirely black. Underside of head yellow, broadly piceous each side behind the eyes; prothorax beneath yellow, balance of ventral surface and legs, including the coxae, black, trochanters somewhat paler. Length 9–10 mm.

MALE.—Head across the eyes slightly wider than pronotum, upper surface smooth and shining, not or very feebly alutaceous, the black area sparsely and rather finely punctate, epicranium beneath more coarsely and densely punctate, becoming somewhat rugose posteriorly; gular sutures parallel, narrowly but distinctly separated. Antennae slender, seven-tenths as long as the body, the joints beyond the third nearly cylindric, second joint three-fourths as long as third, median joints about three and one-half times as long as wide. Terminal joint of maxillary palpi triangular, apex slightly longer than inner side. Pronotum subrectangular, nearly one-third wider than long; lateral margins broadly rounding into the subobsolete front angles, parallel to middle, thence feebly converging to base, slightly sinuate before the hind angles which are not dentiform; surface smooth and shining, very minutely and sparsely punctulate, more densely and with a few coarse punctures along anterior border medially, median impressed line distinct, narrow, nearly attaining the base, abbreviated in front; sides not reflexed, narrowly explanate, the prominent basal callosities nearly reaching the lateral margin, surface at the hind angles flat and not concave. Elytra finely and rather densely rugulose, smoother basally, vaguely bicostulate; pubescence short, not dense, much inclined, cinereous. Abdomen dull, without transverse wrinkles, secondary pubescence evident except at apex; sternites 7 and 8 unmodified. Legs slender, clothed throughout with short pubescence which is not erect or bristling at any point; protibiae and metacoxae not sexually modified; all claws with a broad basal tooth the free angle of which is feebly acute, the angle somewhat produced in the protarsal claws.

FEMALE.—Eyes smaller, head not as wide as pronotum. Antennae about half as long as the body, more slender and of nearly uniform thickness throughout, the basal joint very feebly obconic. Sternite 8 produced in a small apical lobe which is triangularly incised, the incisure as deep as the length of the lobe. Claws similar throughout, with a broad basal tooth, the free angle less acute.

Holotype.—Male; Ithaca, New York, VI–10–42, collected by H. Dietrich, type no. 2374, Cornell University collection.

Allotype.—Female; Taughanic, Ithaca, New York, V–15–15, Cornell U. lot 836, sub. 67, located in Cornell University collection.

Paratypes.—1 male; Ithaca, New York, VI–2–15, in Cornell collection; 1 female, Crosby, Yates County, N. Y., V–21–18, in Cornell collection.

Podabrus dietrichi is an easily recognized species that could not be confused with any other. The smooth yellow pronotum, only narrowly darker at apex, and totally black elytra will at once distinguish *dietrichi* from all the described Nearctic species in which the claws are broadly toothed or appendiculate in both sexes.

It is closely related to *excursus* Fall, described from British Columbia. It should be noted that *excursus* is misplaced in Fall's table, and will, with *dietrichi,* key to couplet 44. The somewhat acute basal tooth of the male protarsal claws will separate both species from the two California species assigned by Fall to that couplet. The present species is named in honor of Dr. Henry Dietrich, from whom the specimens were received.

The characters used by Fall in couplet 36 of his table of *Podabrus* are variable and of doubtful value in discriminating the species involved. The following is offered in substitution for couplets 36, 37, 38, and 39. *Excursus* Fall has been omitted as it should be referred to couplet 41, having the prothorax finely and sparsely punctate and shining.

36. Hind angles of pronotum deeply concave, the sides at that point distinctly reflexed 37
    Hind angles of pronotum scarcely concave, the sides explanate but not reflexed.....38
37. Black, anterior part of head and sides of pronotum reddish yellow, the elytral margins not pale.....**scaber** Lec.
    Piceous, anterior part of head and margins of elytra pale, the sutural pale color not enveloping the scutellum; pronotum ferruginous, varying to blackish with the sides reddish.....**cinctipennis** Lec.
38. Pronotum entirely red; elytra entirely black, or with the sutural bead and side margin very narrowly pale basally, the pale color not enveloping the scutellum.....**punctatus** Lec.
    Pronotum dark with the sides pale; elytral margins pale, the sutural pale color expanding at base to envelop the scutellum.
    limbellus Lec.

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THE ANATOMY OF THE INTERNAL GENITALIA OF FUMEA CASTA PALLAS

(LEPIDOPTERA: PSYCHIDAE)

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(Text-figures)

Introduction

Fumea casta Pallas, a European psychid, was unknown in North America prior to 1931. It was during this year that workers from the Gipsy Moth Laboratory in Melrose Highlands, Massachusetts, discovered this case-bearer in connection with their work on the introduced beech scale, *Cryptococcus fagi* Bar. Farquhar (1934) describes the life history and discusses the distribution in Massachusetts, dispersal, mating behavior and parasites of this insect. The material for this study was taken from the other of the two colonies known to exist in North America in 1934. This second colony is present in the Morris Arboretum which is located in Germantown, Philadelphia, Pennsylvania. In a recent communication Dr. Frank M. Jones states that material sent to him indicates that this insect is on an expanding distribution, even into other states.

The Massachusetts colony represents the descendants of the first of the introduced insects on this continent. The Pennsylvania colony, according to Farquhar, was an introduction from the Massachusetts colony, for many of the older plantings of the Morris Arboretum are said to have originated in the Arnold Arboretum in Boston, Massachusetts. Both of these colonies, according to Jones (1934), are well established and may now be considered as having taken a permanent place in our fauna. The identity of this insect is also discussed by Jones. His descriptions concern the external features and the external genitalia. This study concerns only the internal genitalia. It is, therefore,

a contribution which is to be considered with the previous studies of Farquhar and Jones as a more complete biological record of this recently introduced insect.

The author wishes to thank Dr. Frank M. Jones of Wilmington, Delaware, for suggesting this study and for identifying the material.

Materials and Methods

The material was collected from trees, shrubbery and benches in the Japanese section of the Arboretum. This section was the only place in which cases were found although other sections of the Arboretum were visited. Dr. Jones, in a personal communication, stated that he collected his material from the same area in 1933. The collection of cases only in the Japanese section is no reason for assuming that other sections of the Arboretum or the surrounding countryside are free from infestation.

Visits to the Arboretum were made on April 27, May 4, 11, 18 and 25, in 1946. A fair collection was made on May 18 and a good one on the 25th of May. The cases were placed in half-pint milk bottles containing narrow strips of pasteboard. The pasteboard extended from the bottom to the top of each bottle. The bottles were plugged with cotton and placed outside on the window sills of the laboratory. All of the cases containing pupae remained undisturbed on the bottom of each bottle. In a few instances, although the cases were attached to objects when collected, the larvae had not yet pupated. These larvae, therefore, crawled up on the pasteboard strips in the bottles to reattach their cases. The adults were first observed emerging on the 28th of May and continued until the 4th of June.

Fresh specimens were killed, dissected and their genitalia mounted according to the method described by Williams (1943).

Reproductive Organs

Male. The testes (Fig. 1, A) are fused and enclosed in a single testicular sac. The seminal vesicles (Fig. 1, B) are distinct and are the expanded portions of the vasa deferentia just below the testes. The vasa deferentia (Fig. 1, C) are tubular. They are separated at the proximal ends of the seminal vesicles to a point where they appear to be adherent to each other by connective tissue. The adhered portion consists of the proximal ends of

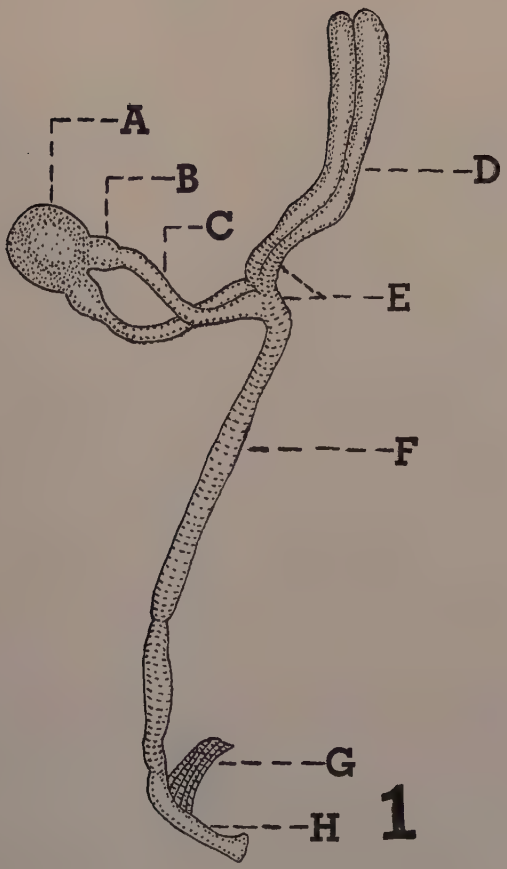

Fig. 1.—Male reproductive organs of *Fumea casta* Pallas.

the vasa deferentia. It is a little less than one-half of the total length of a vas deferens. In several specimens examined the adhered ducts appeared as described. Although the vasa deferentia adhere to each other before they enter the duplex ejaculatory ducts, their individuality can be distinguished. The duplex ejaculatory ducts (Fig. 1, E) have both of the divisions adherent. The individuality of each of the divisions can be distinguished with difficulty.

The accessory glands (Fig. 1, D) are tubular, with the distal ends somewhat expanded. These glands adhere to each other throughout their total length by connective tissue. The simplex ejaculatory duct (Fig. 1, F) is tubular and rather long when compared with that of other members of the Psychidae described by the author. It is composed of an anterior long portion and a posterior short portion. A bundle of striated muscle fibers (Fig. 1, G) is attached at the base of the penis and extends over one-half of this organ towards the distal end. Characters of the penis (Fig. 1, H) are distinguishing features which are peculiar to this species.

Female. There are two ovaries (Fig. 2, I) and each is composed of four polytrophic ovarioles. The number of eggs in the ovaries varies in different females. Each ovarian tube contains from twelve to twenty eggs. The majority of egg-tubes, however, contain nearer twenty eggs to the tube. Females are capable, therefore, of laying from 150 to 160 eggs. This agrees with the observations of Farquhar, who states that females lay 150 eggs. If a female, however, should come at either extreme of the egg-count range, every one of the egg-tubes will contain a number of eggs which is near one or the other of these extremes. The ovary of one female examined had twenty eggs in three of the tubes and nineteen in the fourth tube. This same condition existed in the opposite ovary. The ovary of another female was observed to have twelve eggs in each of three tubes and eleven in the last. The opposite ovary had twelve eggs in each of two tubes, thirteen in the third and ten in the fourth. These observations concern virgin females. Each ovarian tube has a short terminal filament (Fig. 2, W).

The lateral oviducts are tubular and each measures about .5 mm. in length. The median oviduct is about the same length as one of the lateral oviducts. It is also tubular, but has a diameter slightly less than that of the lateral oviducts (Fig. 2, J and U). The vagina (Fig. 2, V) is somewhat expanded in the area of the spermathecal duct. It receives the median oviduct, seminal and spermathecal ducts. The egg-exit duct extends from it.

The bursa copulatrix is composed of a sac (Fig. 2, K) and a duct (Fig. 2, L). The sac contains the spermatophore when the female has completed a mating. The proximal end of the sac narrows to form a small tube. The proximal end of the duct is tubular, but the distal end is expanded. The expanded end of the bursal duct accommodates the copulatory orifice (Fig. 2, M). The bursa copulatrix is attached to the vagina by an extremely short seminal duct.

The spermatheca is composed of a sac which is situated at the distal end. The form of this sac is a psychid characteristic. No spermathecal gland is

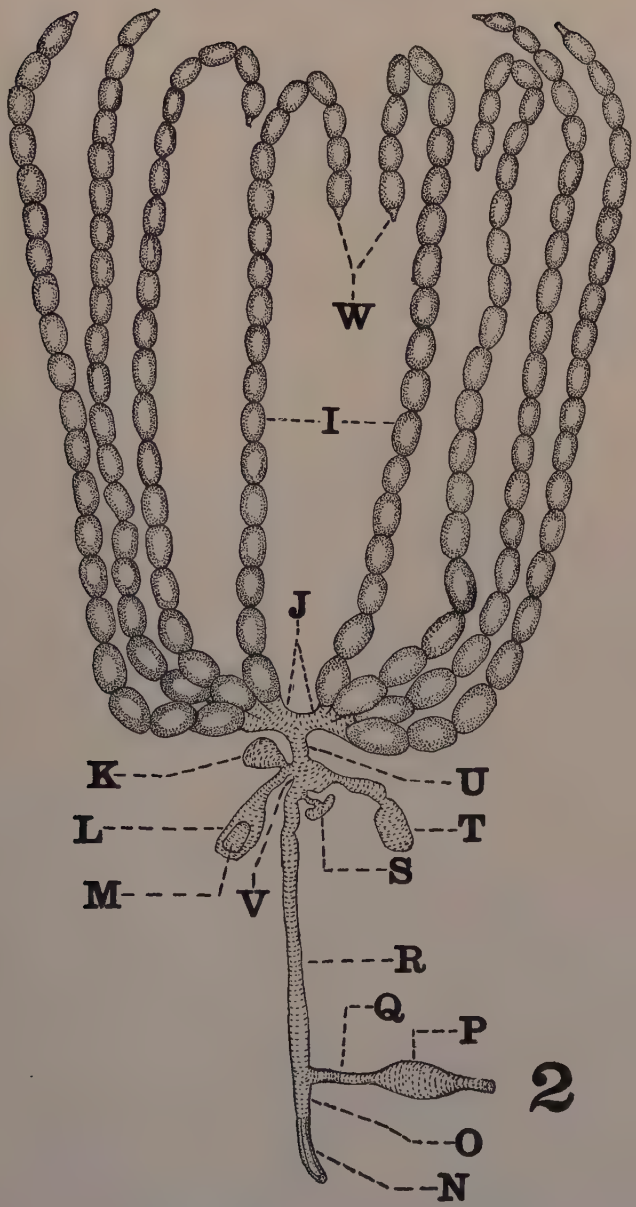

Fig. 2.—Female reproductive organs of *Fumea casta* Pallas. These organs are from a virgin female.

attached to this sac. Spermathecal glands are very common in Lepidoptera. The absence of the spermathecal gland is another psychid characteristic. The spermathecal duct serves as a means of communication between the spermathecal sac and the vagina (Fig. 2, T).

The accessory glands appear to form a continuous short tube with rounded ends. This structure is connected to the egg-exit duct by a short slender duct (Fig. 2, S). The egg-exit duct is a long slender tube (Fig. 2, R). The cloacal duct (Fig. 2, O), as in all psychids, is a short tube. It serves as a common duct for the reproductive and digestive systems. The duct from the digestive system (Fig. 2, Q), leading from the rectum (Fig. 2, P), connects just above the cloacal duct. The characteristics of the ovipositor (Fig. 2, N) can be distinguished.

Discussion and Conclusion

There are two phylogenetic lines of Lepidoptera. One of these is composed of *monotremes* and the other of *diplotremes*. Females of *monotremes* have only one abdominal opening. This opening is situated on the ninth abdominal sternum. It serves as an exit for the digestive and reproductive systems and for pairing. *Monotremes* are further divided into two groups, which are based on the characteristics of the ovipositor and its related structures. The first group contains the families Hepialidae, Micropterygidae, Mnesarchaeidae, Nepticulidae, Tischeriidae and Opostegidae. Females of this group have soft bilobed ovipositors, short egg-exit ducts and rather short or indistinct cloacal ducts.

The second group of *monotremes* contains the families Eriocraniidae, Incurvariidae, Prodoxidae, Adelidae, Crinopterygidae and Heliozelidae. Females of this group have strongly chitinized and piercing ovipositors, rather long egg-exit ducts and long or distinct cloacal ducts. All other Lepidoptera, which compose by far the greatest number, belong to the *diplotreme* line.

Females of diplotremes have two abdominal openings. The first of these is situated on the eighth abdominal sternum and is only used in copulating. The second opening is situated on the ninth abdominal sternum and serves as an exit for the digestive system and for the laying of eggs. No copulation occurs through this opening. All species of the family Psychidae are of the *diplotreme* line.

The comparative anatomy of the internal genitalia of *Thyridopteryx ephemeraeformis* Haw., *Eurukuttarus confederata* Grt.

and *Solenobia walshella* Clem. was described by Williams (1944). The male of *F. casta* has fused testes and differs only from *T. ephemeraeformis* in which the testes are paired. The seminal vesicles can be distinguished from the vasa deferentia and in this respect it resembles *E. confederata* and *S. walshella.* The vasa deferentia are not filamentous like those of *T. ephemeraeformis,* but their diameters are more or less uniform throughout their length. In this respect the vasa deferentia of *F. casta* differ from the flask-shaped vasa deferentia of *E. confederata* and these organs in *S. walshella.* These structures in *S. walshella* vary considerably in diameter and are comparatively longer than those in any of the other species. The duplex ejaculatory ducts are loosely bound with connective tissue. Outlines of these ducts can easily be distinguished. In this respect *F. casta* resembles *E. confederata* and *S. walshella,* but differs from *T. ephemeraeformis.* The simplex ejaculatory duct is rather uniform in diameter. In this respect it is similar to that of *S. walshella,* but is comparatively longer than that found in any one of the other species. The accessory glands of the male are loosely bound with connective tissue throughout their length. *F. casta* differs from the other species in this characteristic. Penial differences are characteristic for each of the species.

The egg-tubes of the female are free at their distal ends. In this respect *F. casta* is similar to *S. walshella.* The lateral and median oviducts are similar in all these species, but the median oviduct of *E. confederata* is comparatively longer than that of the others. The bursa copulatrix and seminal duct resemble those of *E. confederata.* The bursal duct, however, differs in some respects from that of *E. confederata.* The spermatheca is more closely related to that of *E. confederata* than it is to those of the other species. The accessory glands are similar in all three and this is the characteristic psychid type. The egg-exit duct is characteristically longer in this species than that found in any of the others. It should be iterated that the ejaculatory duct of the male *F. casta* is comparatively longer than that found in any of the other species. Ovipositor differences are characteristics of each species.

Summary

1. This study concerns only the anatomy of the internal genitalia of *Fumea casta* Pallas and is to be considered with the previous studies of Farquhar and Jones for a more complete biological record of this recently introduced insect.

2. The material consisted of specimens which were dissected and the internal genitalia treated and mounted according to a referred method. Cases of this insect were collected in the Morris Arboretum of Philadelphia, Pennsylvania, and the pupae raised to adults.

3. The anatomy of the internal genitalia of *F. casta* is given together with a short discussion on the comparative anatomy of three other members of the family Psychidae.

4. *F. casta* is a member of the diplotreme line of Lepidoptera.

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Abbreviations used in the figures are all identified in the foregoing text.

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NOTES ON CERTAIN TYPES OF LEPIDOPTERA DESCRIBED BY BRACKENRIDGE CLEMENS

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Where possible for him to do so, Clemens' type material was placed in the Academy's collection, for on May the 15th, 1859, he wrote to H. T. Stainton of England as follows: "I determined long since to form no collection for myself, and freely give away all specimens I have systematized. Such specimens as are new I add to the collection of the Academy of Natural Sciences in Philadelphia, where any one may find them." Judging from his correspondence, he was very liberal in the distribution of specimens, which may account in part for the scarcity of Clemens' material in the Academy's collection today. No types were originally designated. Coleman T. Robinson must have seen some of Clemens' species for in 1869 he wrote that he had examined certain of Dr. Clemens' original types; yet in his publication (Notes on American Tortricidae),[1] he made no attempt at type fixation, either for his own or Clemens' species. Lord Walsingham and others are accredited with having studied Clemens' types.

During the eighteen seventies Clemens' specimens, as they were from time to time located, were sent to C. H. Fernald[2] for study. In his letter of January, 1878, to E. T. Cresson, he wrote: "these types are in a miserable condition. . . . Since I have found so many errors in Clemens' work and also in Robinson's examinations will you send me the rest of Clemens' types if you can locate them." In February, 1878, he wrote that he had finished with the Clemens types and would now study the Robinson types and send all back together. "I am led to think that Robinson took a few of Clemens' types and incorporated them with his own, for this reason you are not able to find—some of Clemens' types. There remain the

[1] Robinson, C. T., Trans. Am. Ent. Soc., 1869, p. 273.
[2] Fernald's letters on file at the Acad. Nat. Sci., Phila.

following which I wish you would search for carefully," and he gave a list. "I desire to have these types of Clemens and Robinson complete in your collection so that they may be referred to in the future." His intention was to publish a synonymical list of the Tortricidae, which he did in 1882,[3] without mentioning types. "I desire to have the types complete and accessible, that my work may be tested by reference to them." He labeled the returned specimens **"Type"** or "probable type."

On March 26, 1878, Fernald write: "The box of insects reached me all right and success seems to crown your efforts every time you ransack those boxes at the Ent. Soc. rooms. This time you sent me Clem. type of *Tortrix fumiferana,* which Robinson probably never saw as he redescribed it as *Tortrix nigridia.*"

In August, 1900, Busck was at the Academy searching for Clemens' types but found only "an insignificant portion." In 1902 a large proportion of Clemens' types were found and through the cooperation of the U. S. Department of Agriculture, Busck was enabled to spend two weeks at the Academy studying the material. Mr. E. T. Cresson, Jr., at that time affixed the specimens on double mounts. In 1903, Busck published his "Notes on Brackenridge Clemens' Types of Tineina."[4] This was, however, but a recording of type material as he failed to designate specific specimens as "types" or "lectotypes."

There is at the Academy today a book-like box 10¾ inches long by 9 inches wide and 1½ inches between the two panes of glass that form the bottom and top of the box inside the covers. This box, full of microlepidoptera on short English pins, stuck into small pieces of cork glued to the bottom glass, was sent to Dr. Clemens by H. T. Stainton in 1860 and presented to the American Entomological Society in 1867 by Mrs. Clemens. These specimens are as Clemens received them, in good condition, unaffected by time and circumstance. Clemens' specimens were originally in boxes like the one described; had they remained there and been handled less and more carefully there is no question but that they would have been in better condition today, with more types preserved. It is remarkable that this valuable collection did not share the fate of that of Say.

[3] Fernald, Trans. Am. Ent. Soc., 1882.
[4] Busck, Proc. Ent. Soc. Wash., Vol. v. No. 3, pp. 181, 220, 1903.

In 1923 and 1926, Carl Heinrich, in his Revision of the Family Olethreutidae,[5] recognized certain of Clemens' types as being in the collection of the Academy of Natural Sciences of Philadelphia. In 1930, Frank Haimbach[6] validated the types of Clemens' Crambinae in the Academy's collection.

Busck found on the species that he discussed, numbers that agreed with Clemens' hand written list. No convenient list was found for most of the species treated here; some specimens have numbers, but with few exceptions they are not in Clemens' hand nor on the color of paper that he used.

The present paper will supplement Heinrich's by noting the condition of the specimens he referred to, and validate, in so far as possible, the types he recognized. It will also discuss the type status of species not generically covered by Busck and by Haimbach.

As all previous authors referred to Clemens' specimens as "Types," the same will be done in this paper, in preference to the now-accepted term "Lectotype."

The generic listing and sequence for the North American species, is that of the J. McDunnough Check Lists of the Lepidoptera of Canada and the United States, parts I & II, 1938, 1939; with "Type" numbers as per specimens in the collection of the Academy of Natural Sciences of Philadelphia. No specimens have attached locality labels in Clemens' hand.

I. Species listed in Clemens' "Synopsis of North American Sphingidae," Journ. Acad. Nat. Sciences of Philadelphia, 4 (2), 97–190, 1859.

Sphingidae

Ceratomia repentinus [= undulosa Walker], p. 180.

Type not located. Described from the collections of E. Norton & W. H. Edwards.

Sphinx leucophaeata, p. 168.

Type not located. Described from a female from Texas; possibly in Smith's collection.

[5] Heinrich, U.S.N.M., Bull. 123, pp. 1–298, 1923; U.S.N.M., Bull. 132, pp. 1–207, 1926.
[6] Haimbach, Ent. News, XLI, pp. 113–134, 1930.

Sphinx luscitiosa, p. 172.

Type not located. Described from a male, possibly in the C. Newman collection.

Lapara harrisii [= **bombycoides** Walker], p. 188.

Type not located. Described from a specimen in A. S. Packard's collection.

Pachylia lyncea [= **ficus** Linnaeus], p. 159.

Type not found.

Pachylia versuta [= **resumens** Walker], p. 152.

Type, no. 7137; in good condition; labeled, Mexico.

Pachylia inornatana, p. 159.

Type, no. 7136; in good condition and bearing Clemens' label. Honduras.

Xylophanes nitidula, p. 151.

Type no. 7161; in good condition; labeled, Mexico.

Xylophanes thalassina, p. 150.

Type, no. 7162; in good condition; a specimen from H. B. Dewey. Brazil.

Celerio oxybaphi [= **gallii** Rottemburg], p. 145.

Based on the description of a larva.

II. Species listed in Clemens' papers in the Proc. Acad. Nat. Sciences of Philadelphia, "Contributions to American Lepidopterology"; 1860: 4–5, 156–174, 203–221, 345–362, 522–547, and in:

III. Clemens' papers in the Proceedings Entomology Society, Philadelphia, "Micro-Lepidopterous Larvae"; 1861: 87, and "North American Micro-Lepidoptera"; 1864: 417–418, 509–520, 1865: 133–142.

Saturniidae

Agapema galbina, 1860, p. 156.

Type not located. This was a Smithsonian Institution specimen from Texas, in Capt. Pope's collection.

ARCTIIDAE

Pygarctia eglenensis, 1860, p. 533.

This was a Texas species also from Pope's collection.

Ectypia bivittata, 1860, p. 529.

This was also a Texas species from Pope's collection.

Haploa fulvicosta [= **colona** Hübner] 1860, p. 536.

Type not found.

LIMACODIDAE

Sibine stimulea, 1860, p. 158.

The specimen of this common species, of which Clemens described the larva in detail, seems not to have been preserved.

Euclea tardigrada [= **delphinii** Boisduval]
Euclea paenulata [= **delphinii** Boisduval] 1860, pp. 159–160.

Types of Clemens' two forms of this common but variable species have not been found.

Adoneta voluta [= **spinuloides** Herrich-Schaeffer] 1860, p. 158.

Type not found. Clemens established the genus and described male and female moths and larva. A general feeder on various shrubs; Clemens gives the food as apricot.

Lithacodes laticlavia [= **fasciola** Herrich-Schaeffer] 1860, p. 157.

Type, no. 7461. Clemens described the larva and moth and gives the food as maple, in September. In New Jersey I have reared the species on oak; imagoes from early June to August.

MEGALOPYGIDAE

Megalopyge lanuginosa [= **opercularis** Smith & Abbot] 1860, p. 157.

Type not located. Described from a specimen in Pope's collection from Texas.

ZYGAENIDAE

Malthaca perlucidula [= **dimidiata** Herrich-Schaeffer] 1860, p. 541.

Type, no. 7715; in good condition; labeled, Maryland.

Triprocris smithsonianus, 1860, p. 540.

Type not located. Described from a specimen in Pope's collection from Texas.

Acoloithus falsarius, 1860, p. 540.

Type not found.

Harrisina coracina, 1860, p. 539.

Type not located. Described from a specimen in Pope's collection from Texas.

THYRIDIDAE

Dysodia oculatana, 1860, p. 350.

Type not found. The larva and moth are both described. Food, *Eupatorium.*

PYRALIDAE

Nymphula maculalis, 1860, p. 218.

Type, no. 7290. Right forewing and abdomen missing. A light specimen of this variable species.

Nymphula tedyuscongalis [= **seminealis** Walker] 1860, p. 216.

Type not found.

Nymphula formosalis [= **icciusalis** Walker] 1860, p. 217.

Type, no. 7460. A female, expanded and in good condition but lacking abdomen.

Cataclysta helopalis [= **magnificalis** Hübner] 1860, p. 218.

Type not found.

Cataclysta fulicalis, 1860, p. 217.

Type, no. 7279. Lacking abdomen and right hind wing; in rather poor condition but recognizable.

Schoenobius melinellus, 1860, p. 205.

Type, unrecognized. A male specimen, expanded and in good condition excepting abdomen, is labeled type, but as it does not agree with Clemens' meager description, and lacks his number label, it cannot be accepted as the type.

Schoenobius aquilellus, 1860, p. 205.

Type, not found.

Schoenobius longirostrallus [= **forficellus** Thunberg] 1860, p. 205.

Type, no. 7292. A male, right wings and abdomen gone; left wings expanded and in good condition. An attached label in Fernald's hand, says, "The no. 13 on this insect is in Clemens' writing and refers to a paper in his writing with the name Chilo longirostrallus."

Epipaschia superatalis, 1860, p. 14.

Type, no. 7281. A ♂, lacking abdomen and somewhat rubbed but distinguishable. Fernald says, "I think this may be the type." I have reared the species on *Rhus radicans.*

Tetralopha platanella [= **militella** Zeller] 1860, p. 207.

Type, no. 7282. A ♂, expanded and recognizable, abdomen gone. Adult and larvae described in detail.

Tetralopha asperatella, 1860, p. 207.

Type not found. The description agrees with specimens reared on oak.

Salebria virgatella, 1860, p. 205.

Type not found.

Salebria subcaesiella [= **virgatella** Clemens] 1860, p. 206.

Type not found.

Canarsia ulmi-arrosorella, 1860, p. 205.

Type not found.

Hulstia undulatella, 1860, p. 205.

Type, no. 7280. A ♂, expanded and in perfect condition.

Moodna ostrinella, 1860, p. 206.

Type not found. Clemens described the larva and moth of this common species and evidently reared it in the fruit panicles of sumac.

Olethreutidae

Episimus argutanus, 1860, p. 358.

Type, no. 7221; designated by Heinrich, 1926, p. 79. Left wings missing, right wings in good condition.

Episimus hamameliella [= **argutanus** Clemens] 1861, p. 87.

Erected on the description of the food plant and larva.

Polychrosis viteana, 1860, p. 359.

Type, no. 7204; designated by Heinrich, 1926, p. 90. Fernald labeled it, "Type." Left wings missing; maculation on right wings distinct. This species can be differentiated with certainty only by rearing. Clemens described two species as *viteana,* one on grape, the other on sassafras.

Endothenia nubilana [= **antiquana** Hübner] 1865, p. 140.

Type, no. 7319; designated by Heinrich, 1926, p. 105. Left wings missing, right wings expanded sufficiently for recognition. Expanse, 17 mm.

Phaecasiophora mutabilana [= **confixana** Walker] 1865, p. 135.

Type, no. 7211; designated by Heinrich, 1926, p. 127. In perfect condition. Expanse, 19 mm.

Exartema nitidana, 1860, p. 356.

Type, no. 7201; designated by Heinrich, 1926, p. 136. A ♂, abdomen missing, otherwise perfect. Expanse, 20 mm.

Exartema foedana, 1865, p. 135.

Type, no. 7203; designated by Heinrich, 1926, p. 136. A ♀, in perfect condition; labeled, "Type" by Fernald. Expanse, 13 mm.

Exartema inornatana, 1860, p. 357.

Type, no. 7298; here designated. A ♀, not fully expanded but in good condition; Clemens' number, 159, on an orange-colored label attached to the specimen. Clemens described the larva, moth and pupa, giving the food as oak.

Exartema versicolorana, 1860, p. 357; 1865, p. 136.

Type, no. 7297; here designated. A ♂, in good condition, with Clemens' no. 158, on a yellow label. The following is Clemens'

description: "Fore wing yellowish, varied with short, dark brown striae, and shades of the same hue, overlaid with testaceous scales. In the middle of the wing is a dark brownish shade, indicated in the middle of the costa by a nearly square spot. The oblique subterminal band is well indicated, does not reach the costa and the cilia opposite to it on the hind margin are dark brown. At the tip is a dark brown spot, and the cilia of the tip likewise dark brown." As he says in 1865, p. 136, "a specimen in the Society's Collection, in which all the white is replaced by pale testaceous having in certain lights a dull bluish lustre." As the specimen in the Academy's collection agrees with the above description, has a faint "bluish lustre," and belongs to the genus, *Exartema,* as defined by Clemens, I cannot do otherwise than claim that the type of this species is in the collection of the Academy of Natural Sciences of Philadelphia. It is certainly not *appendiceum* or *valdanum* as represented in our collection. Expanse, 15 mm.

Exartema permundana, 1860, p. 356.

Type, no. 7200; designated by Heinrich, 1926, p. 155. Abdomen gone, not fully expanded, otherwise in good condition. I have specimens reared on *Comptonia asplenifolia* that agree with the type. Specimens reared on blueberry differ some in maculation and are brick red in color.

Exartema concinnana, 1865, p. 134.

Type, no. 7202; designated by Heinrich, 1926, p. 158. The right wings mounted on a card are all that is left; they are recognizable.

Exartema fasciatana, 1860, p. 357.

Type, no. 7205; designated by Heinrich, 1926, p. 159. A ♂, in perfect condition; labeled "Type" by Fernald.

Exartema gratiosana [= **ferriferanum** Walker] 1865, p. 134.

Type, no. 7206; designated by Heinrich, 1926, p. 161. Left wings on thorax, right wings on a card. A well-marked species easily recognized.

Hedia nimbatana [= **ochroleucana** Hübner] 1860, p. 346.

Type, no. 7299; designated by Heinrich, 1926, p. 163. Expanded, much rubbed but distinguishable; labeled "Type" by Fernald.

Olethreutes agilana, 1860, p. 359.

Type, no. 7300; designated by Heinrich, 1926, p. 171. Expanded and in good condition; indicated as the "probable type" by Fernald.

Olethreutes coruscana, 1860, p. 346.

Type, no. 7208; designated by Heinrich, 1926, p. 175. A ♂, expanded and in good condition.

Olethreutes instrutana [= **cespitana** Hübner] 1865, p. 135.

Type, no. 7209; designated by Heinrich, 1926, p. 179. Left wings expanded and maculation distinct, right wings on a card; labeled "Type" by Fernald.

Olethreutes bipartitana, 1860, p. 346.

Type, no. 7210; designated by Heinrich, 1926, p. 180. Left wings and abdomen gone, not much remains but the unexpanded right wings; labeled "Type" by Fernald.

Olethreutes intermistana, 1865, p. 140.

Type, no. 7207; designated by Heinrich, 1926, p. 184. A ♂, abdomen gone, maculation distinct; labeled "Type" by Fernald.

Spilonota pyrifoliana [= **ocellana** Schiffermuller] 1860, p. 357.

Type, no. 7317; here designated. A ♂, in good condition; expanse, 16 mm. The life history is given.

Thiodia formosana, 1860, p. 360.

Type, no. 7220; designated by Heinrich, 1923, p. 39. A ♀, abdomen gone, expanded and in recognizable condition, 23 mm.

Thiodia crispana, 1865, p. 137.

Type, no. 7227; designated by Heinrich, 1923, p. 46. A ♀; abdomen gone, not fully expanded, considerably worn.

Thiodia striatana, 1860, p. 349.

Type, no. 7218; designated by Heinrich, 1923, p. 58. A ♀, expanded and in good condition.

Eucosma scintillana, 1865, p. 142.

Type, no. 7212; designated by Heinrich, 1923, p. 97. Right wings gone, left wings remaining and in good condition.

Eucosma dorsisignatana, 1860, p. 353.

Type, no. 7217; here designated. Worn but easily recognizable. A ♂.

Eucosma similiana, 1860, p. 353.

Type, no. 7316; here designated. A ♀, right wings gone, left wings expanded and agreeing in maculation with Clemens' description, as he says, "this may be the female of *dorsisignatana.*"

Eucosma ochreana [= **cataclystiana** Walker] 1864, p. 520.

Type, no. 7213; designated by Heinrich, 1923, p. 135. All that is left are the right wings on a card, hardly distinguishable.

Epiblema flavocellana [= **strenuana** Walker] 1865, p. 138.

Type, no. 7214; designated by Heinrich, 1923, p. 140. Antennae, abdomen, and legs gone, considerably worn but recognizable.

Epiblema scudderiana, 1860, p. 358.

Type, no. 7215; designated by Heinrich, 1923, p. 147. Unexpanded, only right wings remaining, unrecognizable.

Epiblema saligneana [= **scudderiana** Clemens] 1865, p. 141.

Type not found.

Epiblema otiosana, 1860, p. 354.

Type, no. 7216; designated by Heinrich, 1923, p. 154. A ♂, right wings gone but easily recognizable.

Gypsonoma fasciolana, 1864, p. 511.

Clemens described this species from a "single specimen not in good condition." There is in the Academy's collection, a male, abdomen gone and much rubbed, numbered 497, which is the

number for *fasciolana* in Clemens' hand-written list; however Clemens did not affix the number, and the specimen does not agree with his description, it is not "shining white," and there are no indications of a "golden hue." The specimen agrees with Grote's *blakeana,* and based on maculation alone it is difficult to see how the two can be synonymous. I have reared *blakeana* on *Comptonia asplenifolia* in New Jersey, the larva webbing the leaves. I have also specimens from Pennsylvania and Maine. The fresh specimens have a decided pinkish hue, as mentioned by Grote. The specimen labelled "Type" in the Academy's collection, in my opinion, should be rejected.

Gypsonoma salicicolana, 1864, p. 514.

Type, no. 7226; designated by Heinrich, 1923, p. 164. A ♀, in perfect condition, labeled "Type" by Fernald.

Gypsonoma saliciana [= **salicicolana** Clemens] 1864, p. 515.

Type, no. 7228; here designated. A ♂, in perfect condition. In the Fernald collection, now at the U. S. National Museum, there is a specimen labeled, *"Hedya saliciana* Clem. type"; as this undoubtedly was an extraction from the Clemens' collection it can be considered only as a cotype; with this Carl Heinrich agrees.

Exentera cressoniana [= **improbana** Walker] 1864, p. 514.

Type, no. 7222; designated by Heinrich, 1923, p. 174. A ♂, left wings attached to thorax and in good condition; right wings on a card; abdomen gone; labeled "Type" by Fernald.

Exentera spoliana, 1864, p. 513.

Type, no. 7223; designated by Heinrich, 1923, p. 175. A ♂, much rubbed, indistinguishable by maculation alone; labeled "Type" by Fernald. The right wings of another specimen are on a card and in perfect condition.

Exentera costomaculana, 1860, p. 349.

Type, no. 7224; designated by Heinrich, 1923, p. 178. A ♂, in good condition.

Exentera virginiana, 1864, p. 512.

Type not found.

Gretchena deludana, 1864, p. 513.

Type not found.

Epinotia packardiana [= **solicitana** Walker] 1864, p. 417.

Type not found.

Epinotia timidella, 1861, p. 87.

Erected on the description of the larva, "Found on underside of oak leaf." A reared series in the Academy's collection.

Epinotia aceriella, 1861, p. 87.

Erected on the description of the larva. Reared specimens in the Academy's collection; food, maple.

Epinotia signatana [= **aceriella** Clemens] 1864, p. 514.

Type, no. 7219; designated by Heinrich, 1923, p. 224. A ♂; right wings gone, left wings expanded and in good condition; labeled "Type" by Fernald.

Epinotia variana [= **aceriella** Clemens] 1864, p. 520.

Type unrecognized. A specimen labeled type in the Academy's collection is an unexpanded *signatana*.

Anchylopera nubeculana, 1860, p. 349.

Type, no. 7230; designated by Heinrich, 1923, p. 234. Not expanded but cannot be other than represented.

Anchylopera lamiana, 1864, p. 513.

Type, no. 7244; here designated. A ♀, expanded and in good condition; labeled "Type" by Fernald. The specimen agrees with Clemens' description, and as he says, "strongly resembles *spireaefoliana*." Dyar seems not to have recognized the species.

Anchylopera spireaefoliana, 1860, p. 348.

Type, no. 7231; designated by Heinrich, 1923, p. 236. In perfect condition and accepted as the type though differing somewhat from Clemens' description.

Anchylopera fuscociliana, 1864, p. 512.

Type, no. 7243; designated by Heinrich, 1923, p. 241. A small ♀, in perfect condition. Labeled "Type" by Fernald.

Anchylopera dubiana [= **fuscociliana** Clemens] 1864, p. 512.

Type, no. 7232; designated by Heinrich, 1923, p. 241. A large ♂, in good condition.

Anchylopera platanana, 1860, p. 349.

Type, no. 7245; designated by Heinrich, 1923, p. 241. A ♂, in good condition. Compared with reared specimens on sycamore.

Anchylopera pulchellana, 1864, p. 511.

Type, unrecognized. There is in the Academy's collection a specimen, labeled "Type?" by Fernald. Clemens says, "this may be a variety of *A. spireaefoliana,*" and he proceeds to describe such a species; the description however does not fit the specimen labeled *pulchellana* in the Academy's collection, which is referable to *laciniana,* Zeller. I have reared on white oak specimens that agree with those determined as *laciniana.*

Ancylis plagosana [= **unguicella** Linnaeus] 1864, p. 417.

Type, no. 7246; designated by Heinrich, 1923, p. 250. Right fore wing and abdomen gone; maculation distinct. A paratype with abdomen gone, otherwise in better condition than the type.

Ancylis mediofasciana, 1864, p. 511.

Type, no. 7229; here designated. Lacking abdomen and much worn, but sufficiently preserved to permit identification. Compared with fresh specimens from Maine. Expanse, 16.5 mm.

Ancylis ocellana [= **tineana** Hübner] 1864, p. 510.

Type not found.

Dichrorampha simulana, 1860, p. 351.

Type, no. 7252; designated by Heinrich, 1926, p. 12. Head and abdomen gone, otherwise well preserved.

Dichrorampha incanana, 1860, p. 351.

Type, no. 7251; designated by Heinrich, 1926, p. 13, with the remark, "Clemens' type, a small male with a distinct costal fold." Left wings only preserved. Labeled "Type" by Fernald.

Sereda lautana, 1865, p. 139.

Type, no. 7249; designated by Heinrich, 1926, p. 25. In perfect condition. Freshly emerged specimens taken in oak woods

might indicate that the food was oak. The coppery hue mentioned by Clemens is in the striae beyond the basal patch and the "violet hue," is in what Forbes (p. 391) calls the "lead-colored stripes." Clemens does not mention the jet black terminal markings which are more than mere dots, the apical two being very pronounced.

Grapholitha interstinctana, 1860, p. 351.

Type, no. 7247; designated by Heinrich, 1926, p. 36. Sufficiently well preserved for determination. Compared with reared specimens.

Grapholitha tristrigana, 1865, p. 133.

Type, no. 7248; designated by Heinrich, 1926, p. 39. Left hind wing gone, otherwise perfect.

Thiodia parmatana
Ephippiphora parmatana Clemens, 1860, p. 352.

Type, no. 7250; here designated. A ♂; left wings attached to thorax, with maculation distinct; palpi and vestiture preserved; antennae mutilated. Labeled "Type" by Fernald, and bearing a yellow label, number, 144, that being the number for *parmatana* in Clemens' hand-written list accompanying his types. The confusion concerning this species seems explanable. Clemens removed the right wings for venational study, possibly had his attention distracted, and when examination was resumed, confused the wings of a *Laspeyresia* with the specimen of *Thiodia* that he had before him. Quoting from Clemens' letter to H. T. Stainton, December 29th, 1857: "I write to correct a most mortifying error in my delineation of the neuration of the anterior wing of *Lithocolletis robiniella.* When I wrote I was quite confident of its correctness from having made frequent and, as I supposed, careful examinations with single lenses. . . ." Mistakes are easily made.

The type, here designated, agrees with Clemens' description. "Head rough; ocelli large; eyes prominent. Palpi truncate, grayish brown, broad and flattened, and thickly haired beneath and at the tip. Fore wing brown with a white dorsal patch near the middle; the costa from the middle to the tip has four white spots, each having a dark streak in the center, the external streak run-

ning to the hind margin beneath the tip, the internal one which is double, and fainter than the exterior one, terminates in a slightly silvery hued ocelloid patch, having a pale ochreous center and two black streaks." The inner boundary of the speculum is erect, much straighter than usual for the genus.

TORTRICIDAE

Coelostathma discopunctana, 1860, p. 355.

Type, no. 7259; here designated. A ♂, in perfect condition but not fully expanded. Clemens says, "palpi and head pure white above." In the type specimen they are light fawn.

Amorbia humerosana, 1860, p. 352.

Type, no. 7275; here designated. A ♀, in good condition but not fully expanded.

Sparganothis reticulatana, 1860, p. 353.

Type, no. 7258; here designated. A ♀, unexpanded but in good condition; it has the dark orange reticulations.

Sparganothis breviornatana [= **xanthoides** Walker] 1865, p. 140.

Type, no. 7261; here designated. A ♂, right wings and abdomen gone, left wings expanded and in good condition; labeled "Type" by Fernald. A very light specimen.

Sparganothis unifasciana, 1864, p. 516.

Type, no. 7260; here designated. An unexpanded, considerably rubbed specimen with right wings gone. The type specimen of the synonymous *Tortrix puritana,* Robinson, is in perfect condition. A large reared series proves that maculation alone is not sufficient for identification.

Sparganothis sulfureana, 1860, p. 353.

Type, no. 7255; here designated. Abdomen gone, a very pale specimen.

Sparganothis fulvoroseana [= **sulfureana** Clemens] 1864, p. 516.

Type, no. 7320; here designated. A pale specimen, right wings gone.

Sparganothis virginiana [= **sulfureana** Clemens] 1864, p. 517.

Type, no. 7256; here designated. A dark well-marked specimen, the right wings on a card, a good representation of this variable species.

Sparganothis gallivorana [= **sulfureana** Clemens] 1864, p. 517.

Type, no. 7257; here designated. A ♂, with deep orange reticulations and pronounced fasciae.

Platynota flavedana, 1860, p. 348.

Type, no. 7268; here designated. A ♀, recognizable though unexpanded and lacking abdomen. A ♂, paratype, unexpanded. A synonymous specimen, *Tortrix laterana* Robinson, in the Academy's collection, a ♀, in good condition, is hereby designated as the lectotype.

Platynota sentana [= **idaeusalis** Walker] 1860, p. 348.

Type, no. 7270; here designated. A ♂, left wings in good condition, right wings gone; labeled "Type" by Fernald.

Archips blandana [= **persicana** Fitch] 1864, p. 515.

Type, no. 7266; here designated. A ♂. Clemens says: "A single specimen, not in good condition, from A. S. Packard Jr., Maine." Recognizable as a well-known northern species.

Archips vesperana [= **obsoletana** Walker] 1865, p. 136.

Type, no. 7263; here designated. A ♂, right wings in perfect condition, on a card; left wings attached to thorax and almost immaculate; labeled "Type" by Fernald.

Archips fervidana, 1860, p. 347.

Type, no. 7314; here designated. Recognizable though lacking abdomen and both hind wings. A series reared on oak is in the Academy's collection.

Archips fractivittana, 1865, p. 136.

Type, no. 7264; here designated. A ♂, 22 mm., in perfect condition. Robinson redescribed this species as *Tortrix fumosa* from a ♀ in the Academy's collection, designated by Klots as the lectotype.

Archips semifuscana [= **melaleucana** Walker] 1864, p. 519.

Type, no. 7267; here designated. A ♂, in good condition; labeled "Type" by Fernald. Expanse, 17 mm.

Archips purpurana, 1865, p. 136.

Type, no. 7262; here designated. Without abdomen and poorly mounted but recognizable; labeled "Type" by Fernald. In the Academy's collection is Robinson's *Tortrix guritana,* a synonym, a ♀, designated as the lectotype by Klots.

Archips fumiferana, 1865, p. 139.

Type, no. 7273; here designated. A ♂, a much worn specimen. Robinson redescribed this species as *Tortrix nigridia,* and a cotype in the Academy's collection is in perfect condition.

Tortrix peritana, 1860, p. 356.

Type, no. 7272; here designated. A ♂, not fully expanded, otherwise in good condition. A specimen with Clemens' no. 155, here designated as a paratype.

Tortrix virescana, 1865, p. 140.

Type, no. 7265; here designated. Abdomen and left wings gone; unexpanded but distinguishable from *peritana* Clemens, in that it does not have a complete median fascia.

Tortrix fuscolineana [= **afflictana** Walker] 1865, p. 137.

Type, no. 7315; here designated. A ♂, in good condition; expanse, 22 mm.

Argyrotaenia incertana [= **velutinana** Walker] 1865, p. 138.

Type, no. 7269; here designated. In good condition but lacking abdomen.

Argyrotaenia lutosana, 1865, p. 138.

Type, no. 7274; here designated. A ♂, rather worn. The species is now recognized as synonymous with *velutinana* Walker.

Argyrotoxa albicomana, 1865, p. 137.

Type, no. 7271; here designated. A ♀, in good condition; expanse, 15 mm. A paratype, with left wings only.

Peronea viburnana [= **schalleriana** Linnaeus] 1860, p. 347.

Type, no. 7254; here designated. Not fully expanded and lacking abdomen, otherwise in good condition, with Clemens' no. 131 attached. It agrees with Robinson's figure of the species (colored plate VII, fig. 66).

Peronea flavivittana, 1864, p. 516.

Type, no. 7312; here designated. A ♂, in good condition, expanse, 19 mm. The confusion concerning the type status of this species should be cleared by the fixation of labels where they belong. Robinson [7] refers to *Teras flavivittana* Clemens, as being a "Jas. Ridings" specimen, therefore it was in the American Entomological Society's collection, and he illustrates in color (plate VII, figs. 60–61), two specimens now in the Academy's collection, in good condition, as *flavivittana* Clemens. Through some error the labels on these two specimens were reversed, figure 60, as illustrated, represents the type, and is now so labeled; it has the "yellow streak along the dorsal margin limited towards the costa, by the fold of the wing." Figure 61 is a variation. Also illustrated (plate VII, fig. 62) is Robinson's *Teras perspicuana,* a rubbed but recognizable ♀, hereby designated as the lectotype.

Peronea maculidorsana, 1864, p. 516.

Type, no. 7253; here designated, much tattered but recognizable. It agrees with reared specimens on *Vaccinium,* which seems to be a normal food plant.

Peronea gallicolana, 1864, p. 516.

Type, no. 7313; here designated. Abdomen gone, otherwise in good condition. A paratype also in good condition excepting abdomen. Clemens had four specimens.

Phalonia fuscostrigana [= **deutschiana** Zetterstedt] 1864, p. 417.

Type, no. 7276; here designated. The right fore wing is all that is left of this specimen collected in Labrador, by A. S. Packard Jr. Labeled "Type" by Fernald. Clemens' description is so meager, that were it not for Fernald's label it would be difficult to recognize the type.

[7] Robinson, C. T., Trans. Am. Ent. Soc., 1869, p. 280.

Phalonia angustana, 1860, p. 354.

Type, no. *7277*; here designated. Left wings missing; right fore wing attached to Clemens' number 152; indicated as the probable type by Fernald.

Phalonia lepidana, 1860, p. 355.

Type, no. *7278*; here designated. A ♂, expanded and in good condition but lacking abdomen; indicated by Fernald as the probable type. Another specimen without abdomen and not so well preserved, I designate as a paratype.

Comments

The conclusions reached in this paper are of course somewhat arbitrary. No types were designated by Dr. Clemens, and nearly all identifying numbers he may have had on the pins have been removed. C. H. Fernald's labels, attached as noted, are in most instances all that indicates with certainty that these were Clemens' specimens. With few exceptions, all of Clemens' specimens are now on double mounts, systematically arranged and labeled.

A few of his specimens are unexpanded and cannot possibly be the ones from which descriptions were made, however, they have been generally accepted as the types. Some specimens are in such a poor state of preservation that they are recognizable only because they represent well-known species. Combine these observations with some meager descriptions and you have the resulting confusion in type fixation. I hope this study will stand the test of critical observation.

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A SYSTEMATIC ANNOTATED ARRANGEMENT OF THE GENERA AND SPECIES OF THE ETHIOPIAN EPHYDRIDAE (DIPTERA)

II. The Subfamily Notiphilinae

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This paper deals with the genera and species of the subfamily Notiphilinae, and is the second part of the present series on the African Ephydridae.[1] I have recognized nine genera and thirty species, of which six are described as new.

For the material which has made this work possible, besides that in the collection of the Academy of Natural Sciences of Philadelphia [ANSP], I am indebted particularly to the authorities of the Deutsches Entomologisches Institut, Berlin-Dahlem [DEI], Imperial Institute of Entomology, London [IIE], University of Kansas, Lawrence, Kansas [KU], Transvaal Museum [TM], and the United States National Museum [USNM].

Subfamily NOTIPHILINAE

1929. Notiphilinae Cresson, Trans. Amer. Ent. Soc., LV, p. 180.
1946. Notiphilinae Cresson, Trans. Amer. Ent. Soc., LXXII, p. 227.

The name Notiphilinae has been used by other authors, but seldom in the present restricted sense, and not definitely defined. It was first used in the present sense by me in 1929, and was first defined by me in 1946. However, a fuller diagnosis is given below.

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[1] The first part, on the subfamily Psilopinae, appeared in these Transactions LXXII, pp. 241–264, 1946, and contains the introduction to the present series of papers.

Setation usually strong and complete. Head closely applied to the thorax; in cephalic aspect rounded, with small mouth; occiput concaved; eyes not conspicuously prominent; reclinate frontals usually present; face flat or convex, not strictly tuberculous (except in *Ilythea*); facialia and facial series of setae about parallel to orbits, ending at lower part of antennal foveae, not converging dorsad to end of interfoveal carina; medifacies bare; no oral cilia; proboscis not bulbous at base. Dorsocentrals well developed, arranged 0:1, 1:1, or 1:2; anterior notopleural present and usually well developed.

Key to the Ethiopian Genera of the Notiphilinae

1. Ocellars generally weaker than (rarely as strong as) the postocellars; eyes generally distinctly pilose; costa attaining vein IV.....2
   Ocellars stronger than postocellars, the latter often minute or wanting; eyes bare; lunule undeveloped; posterior notopleural weak...5
2. Posterior notopleural aligned with anterior one, and near the notopleural suture (Tribe Hydrelliini)....**Hydrellia** Robineau-Desvoidy
   Posterior notopleural removed dorsad from the suture, not aligned with anterior one.....3
3. Face swollen, with nose-like profile; wings rather uniformly spotted (Tribe Ilytheini).....4
   Face not swollen, nor has it a nose-like prominent profile (Tribe Hydrinini).....**Nostima** Coquillett
4. Vein II short, almost straight to costa; costal section II and III almost equal in length.....**Zeros** Cresson
   Vein II long, much of it parallel to costa; costal section II much longer than III; only one postsutural dorsocentral present. **Ilythea** Haliday
5. Mid-tibia with one to four erect or suberect extensors (bristles), the basal one always present; generally opaque, pollinose species (Tribe Notiphilini).....7
   Mid-tibia without such extensors; shining black, *Psilopa*-like species (Tribe Typosilopa).....6
6. Antesutural dorsocentral present; facials strong..**Typopsilopa** Cresson
   Antesutural dorsocentral absent; facials weak...**Psilopoidea** Cresson
7. Costa not attaining vein IV; ocellars not cephalad of line of anterior ocellus; antennal spine strong.....**Notiphila** Fallen
   Costa attaining vein IV; ocellars cephalad of line of anterior ocellus; antennal spine weak.....8
8. Mesonotal setulae well developed; sternopleural seta present. **Paralimna** Loew
   Mesonotal setulae undeveloped or absent; no sternopleural seta present.....**Oedenops** Becker

Tribe Hydrelliini

1943. Hydrelliini Cresson, Trans. Amer. Ent. Soc., LXX, p. 163.

HYDRELLIA

1830. *Hydrellia* Robineau-Desvoidy, Essai Myod., p. 790.

Hydrellia lunata Cresson

1932. *Hydrellia lunata* Cresson, Trans. Amer. Ent. Soc., LVIII, p. 3. [Cape of Good Hope.]

This species has the mesonotum unicolorous and rather shining, including the anterior margin but excepting the white humeri.

Hydrellia portis Cresson

1932. *Hydrellia portis* Cresson, Trans. Amer. Ent. Soc., LVIII, p. 4. [Cape of Good Hope.]

Here the mesonotum is subopaque, olivaceous with the anterior margin cinereous.

Tribe Hydrinini

1946. Hydrinini Cresson, Trans. Amer. Ent. Soc., LXX, p. 175.

NOSTIMA

1900. *Nostima* Coquillett, Can. Entom., XXX, p. 35.

Nostima (Philygriola) kenyaensis Cresson

1943. *Nostima* (*Philygriola*) *kenyaensis* Cresson, Notulae Nat., Phila., no. 121, p. 3. [Kenya.]

Tribe Ilytheini

1943. Ilytheini Cresson, Trans. Amer. Ent. Soc., LXIX, p. 2.

ZEROS

1943. *Zeros* Cresson, Trans. Amer. Ent. Soc., LXIX, p. 10.

Zeros intermedius Cresson

1943. *Zeros intermedius* Cresson, Trans. Amer. Ent. Soc., XLIX, p. 11, pl. 2, fig. 11. [Cape of Good Hope.]

Zeros invenatus (Lamb), Trans. Linn. Soc. London, Zool., XV, p. 322, fig. 12, 1912. [Seychelles Islands.] *Zeros invenatus,* Cresson, Trans. Amer. Ent. Soc., XLIX, p. 12.

Unknown to me but no doubt belongs to this genus.

ILYTHEA

1839. *Ilythea* Haliday, An. Nat. Hist., III, p. 408.

Ilythea fractivergata Lamb, Trans. Linn. Soc. London, Zool., XV, p. 321, fig. 11, 1912. [Seychelles Islands.] *Zeros fractivergatus,* Cresson, Trans. Amer. Ent. Soc., XLIX, p. 15, 1943.

Unknown to me but apparently belongs here.

Tribe NOTIPHILINI

1946. Notiphilini Cresson, Trans. Amer. Ent. Soc., LXXII, p. 228.

OEDENOPS

1930. *Oedenops* Becker, Mitt. Zool. Mus. Berlin, II, p. 178.

Oedenops isis Becker

1903. *Oedenops isis* Becker, Mitt. Zool. Mus. Berlin, II, p. 178, pl. 4c, figs. 37–40. [Egypt.]

1929. *Oedenops nuda* Cresson (not Coquillett), Trans. Amer. Ent. Soc., LV, p. 183.

EGYPTIAN SUDAN: Atbara, V 3, (Ebner), [Vienna, 1]. Island Elephantina near Assuan, [Vienna, 1].

I have since considered *isis* Becker separate and distinct from *nuda* Coquillett.[2]

A species of arid environment, and possibly may occur further south.

PARALIMNA

1862. *Paralimna* Loew, Monogr. N. Amer. Dipt., I, p. 138.

1862. *Paralimna* Loew, Ofvers. K. Svenska Vet.-Akad., Forh., XIX, p. 13.

Subgenus **Paralimna**

1916. [*Paralimna*] (*Paralimna*) Cresson, Trans. Amer. Ent. Soc., XLII, p. 105.

1923. *Poecilothorax* Becker, Denkschr. Akad.-Wissens. Wien, XCVIII, p. 73.

1929. *Paralimna,* Cresson, Trans. Amer. Ent. Soc., LV, p. 187. Syn. of *Poecilothorax.*

Paralimna (Paralimna) nigripes Adams

1905. *Paralimna nigripes* Adams, Kans. Univ. Sci. Bull., III, p. 178. [Rhodesia.]

1914. *Paralimna nigripes,* Bezzi, Bol. Lab. Zool. Portici, VIII, p. 307. [Nigeria.]

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[2] These Transactions, LXXII, p. 229, 1946.

1929. *Paralimna nigripes,* Cresson, Trans. Amer. Ent. Soc., LV, p. 186. [Lorenzo Marquez, Rhodesia, Cape Colony.]

Apparently a South and Central African species. Bezzi's record of the species from Nigeria may be questioned. In addition to previous records I can report the following:

BELGIAN CONGO: Elizabethville, IX 11, (Miss A. Mackie); Dilolo, Katanga, VII 24–27, (Miss Mackie); Tenke, Katanga, VII 30, VIII 9, (T. D. A. Cockerell); [all IIE, 3]. ANGOLA: near Kasai River, VII 25, (Miss Mackie), [IIE, 1]. RHODESIA: Chilanga, Northwestern Rhodesia, V 21, (R. C. Wood; on wet ground by stream), [IIE, 1].

Paralimna (Paralimna) puncticollis Becker

1923. *Paralimna puncticollis* Becker, Denksch. Akad. Wissen. Wien, CXVIII, p. 72. ♀. [Egyptian Sudan.]

1923. *Poecilothorax angustus* Becker, Denksch. Akad. Wissen. Wien, CXVIII, p. 73. ♂. [Egyptian Sudan.]

1929. *Paralimna puncticollis,* Cresson, Trans. Amer. Ent. Soc., LV, p. 187. [Eritrea, Transvaal.]

This species has greater range than *nigripes* Adams, but my 1929 record for Barberton, Transvaal may be too far south for this species, therefore, incorrect. Additional localities are:

SOUTHERN RHODESIA: Salisbury, VI, [IIE, 2]: XII, (F. H. Snow), [KU, 3, including 2 paratypes of *nigripes*]. KENYA: Ngong, V, (G. V. L. Van Someren), [IIE, 8]. SIERRA LEONE: Konta, III 24, (J. J. Simpson); Newlin, IX 11, (E. Hargreaves), [IIE, 2].

Similar to *nigripes* but the tarsi are pale and the arista has nine to ten hairs; the mesonotal irrorations are more in evidence.

A pair (♂, ♀) from Ngong, Kenya [IIE], may be another species, but probably are merely a form of this one. They differ, for the most part as follows:

Face sericeous, mottled with ochraceous and blackish; tarsi including flexor scopa are black; mesonotum with larger brown areas, reducing the distinctness of the vittae and irrorations; lateral parts of the scutellum are black. Abdominal tergites IV and V of the male are entirely shining black, or slightly cinereous in certain aspects; V much longer than IV and convex; the gray fascia of the female are much reduced on tergite V and none on VI; the dark fasciae in both sexes are rather shining. Wings strongly infumated.

Head in profile very prominent at antennae, with the face, ventrad retreating; frons slightly convex, almost horizontal; arista with six hairs.

Paralimna (Paralimna) nidor Cresson

1933. *Paralimna nidor* Cresson, Ann. Mag. Nat. Hist., (10), xi, p. 31. [Kenya.]

1933. *Paralimna pokuma* Cresson, Ann. Mag. Nat. Hist., (10), xi, p. 32. [Sierra Leone.] Present syn.

Uganda: Masaka, X 14, (G. L. R. Hancock; in swamp), [IIE, 1]. Kenya: Nairobi, (topotypes of *nidor* with same data as type and paratypes), [IIE, 7]. Ngong, V, (G. V. L. Van Someren), [IIE, 13].

Similar to *nigripes* but all the lighter markings are ochraceous rather than cinereous; the face is brownish (♂), or dark brown (♀). The head has the antennae situated very high, in profile, throwing the frons almost horizontal; tarsi are pale, and the antero-flexor cilia of the male fore femur is almost indiscernible.

The form from Sierra Leone, described as *pokuma* appears to be a large variety with a longer face.

Paralimna (Paralimna) adversa Cresson

1933. *Paralimna adversa* Cresson, Ann. Mag. Nat. Hist., (10), xi, p. 28. [Sierra Leone.]

This species has the head almost cubiform, with short face and convex frons. The face is brownish cinereous with a broad oblique brown stripe from the lower orbit to the oral margin; one long facial; bucca cinereous; the mesopleura with brown markings but not largely brown; tarsi somewhat brownish. The anterior frontorbital is distinctly in advance of the frontal, a rather unique feature.

Paralimna (Paralimna) bona Cresson

1933. *Paralimna bona* Cresson, Ann. Mag. Nat. Hist., (10), xi, p. 29. [Kenya.]

Kenya: Moyale, X 13, (R. J. Story), [IIE, 1].

Head rather cubiform; face short with two to three short facials; cheeks and mesopleura as in *adversa;* legs entirely black.

Paralimna (Paralimna) setifemur Cresson

1939. *Paralimna setifemur* Cresson, Notulae Nat., Phila., no. 21, p. 10. [Kenya.]

This species is unique among the African members of the genus in having the postflexor cilia of the fore femur consisting of nu-

merous, usually closely set or crowded setae. The head is short with two to three strong facials.

Paralimna (Paralimna) lynx Cresson

1933. *Paralimna lynx* Cresson, Ann. Mag. Nat. Hist., (10), XI, p. 30. [Sierra Leone.]

A relatively large species with a long face, cinereous (except laterally), bearing long slender facials; bucca brown with a long bristle extending beyond the facial contour; pleura almost entirely brown; fore femur of the male without developed anterio-flexor cilia.

Paralimna (Paralimna) lamborni new species

This species may be distinguished by its long face with prominent interfoveal hump, brown postbucca and pleura, the latter with a broad ochraceous humeral stripe to base of wing; also by the pale fore tibiae which is a unique feature.

Pale, yellowish, are the fore tibiae, basal two or three segments of the tarsi, and halteres. Squamae whitish; wings distinctly infumated but immaculate. All femora, mid and hind tibiae are black.

General color of the vestiture is ochraceous, variegated with many chocolate-brown markings. Frons, mesonotum and scutellum almost entirely brown; face except interfoveal hump and ventro-caudal angles, sharply defined humeral-notopleural stripe, hypopleura, metanotum, and narrow abdominal fasciae, gray to ochraceous; abdominal tergite II cinereous, with a brown latero-basal spot; tergites III to V brown with narrow cinereous subapical medianly interrupted fasciae; ventro-lateral margins cinereous; mesal margins of ventral lobes brown.

Head large, with long narrow face, which in profile has a prominent interfoveal hump, ventrad of which the contour is convex, then rather protruding to epistoma; all facials fine, not as strong as the frontorbital, and are situated well above line of buccal orbit; cheeks about .2 height of head. Length, 6 mm.

TYPE.—Female; Moshi, ("German East Africa") Tanganyika; (Capt. W. A. Lamborn); May 3, 1916; [British Museum Natural History].

Paralimna (Paralimna) arabica Becker

1910. *Paralimna arabica* Becker, Denksch. Akad. Wissen. Wien, LXXI, p. 154. [Arabia.]

1929. *Paralimna arabica,* Cresson, Trans. Amer. Ent. Soc., LV, p. 186. Type designation.

No definite type locality had been given for this species, but it probably occurs in the southern part of Arabia. I have not seen any other than the three males of the type series as reported in 1929.

A cinereous species without or with indistinct dark abdominal fasciae. The head, in profile, is high with almost horizontal frons; the antennae are situated above the center-line of the eyes; second segment of the antennae is without a dorsal silvery spot.

Paralimna (Paralimna) nubifer Cresson

1929. *Paralimna nubifer* Cresson, Trans. Amer. Ent. Soc., LV, p. 187. [East Belgian Congo.]
1933. *Paralimna comata* Cresson, Ann. Mag. Nat. Hist., (10), XI, p. 25. [Southern Nigeria.]
1933. *Paralimna distenta* Cresson, Ann. Mag. Nat. Hist., (10), XI, p. 27. [Northern Nigeria.]
1933. *Paralimna egena* Cresson, Ann. Mag. Nat. Hist., (10), XI, p. 28. [Southern Nigeria.]

The study of additional material made it impossible to separate satisfactorily the forms described under the names here placed in synonymy.

A large, widely distributed species in the equatorial region from Kenya to Northern Rhodesia, but apparently not occurring in the heavily forested areas of the Congo. However, it is found in Nigeria westward to Sierra Leone, and will probably be found in those countries north of the forest area, thus completing the distribution between Uganda and Nigeria.

The species has a high head, in profile, with the antennae situated well dorsad, the face in consequence long. The trochanters and nearly all of the tarsi are orange; the latter dark only at their tips. The postflexor ciliation of the fore femur of the male is sparse to almost wanting.

I have seen numerous specimens from Kenya, Uganda, Belgian Congo, Nyasaland, Northern Rhodesia, Nigeria, Lower Dahomey, Gold Coast and Sierra Leone. A form occurring in Uganda has distinct clouds at the apical part of the first, second and third veins.

Paralimna (Paralimna) albonotata Loew

1862. *Paralimna albonotata* Loew, Oefv. K. Svenska Vet.-Akad. Forh., XIX, p. 13. ["Caffraria."]

1929. *Paralimna albonotata,* Cresson, Trans. Amer. Ent. Soc., LV, p. 191. [Transvaal, Cape Colony.]

This well-marked species is readily recognized by the silvery-white spot on the upper surface of the second antennal segment. There is an antenna-orbital spot of intense velvety-black which is very conspicuous; the face, pleura and abdomen are whitish, well contrasting with the ochraceous and brown of the frons and mesonotum; the wings are immaculate except for some slight infuscation about the posterior crossvein.

The species is apparently confined to Africa. Becker's record [8] of it from Formosa probably refers to *hirticornis* Meijere. To my previous (1929) records I can add the following:

ZULULAND: Research Laboratory, Nagana, (H. H. Curson; 1922), [IIE, 4]. KENYA: Emali Range, Sultan Hamud, 4900–5900 ft. alt., III, [IIE, 18].

Paralimna (Paralimna) pupulata Cresson

1939. *Paralimna pupulata* Cresson, Notulae Nat., Phila., no. 21, p. 9. [Kenya.]

KENYA: Meru, VII, (G. V. L. Van Someren), [IIE, 4]. BELGIAN CONGO: Tabibimba, VIII, (J. Ogelvie), [IIE, 1].

Similar to *confluens* but is shining with no usual brown pollinose vestiture, and the wings are immaculate, yellowish.

Paralimna (Paralimna) confluens Loew

1862. *Paralimna confluens* Loew, Oefver. K. Svenska Vet.-Akad. Forh., XIX, p. 13. ["Caffraria."]

1905. *Paralimna ornatipennis* Adams, Kans. Univ. Sci. Bull., III, p. 179. [Rhodesia.]

1929. *Paralimna confluens,* Cresson, Trans. Amer. Ent. Soc., LV, p. 193. [Transvaal.]

A species characterized by the maculate wings, which have series of fuscous bars between the veins tending to arrange themselves into transverse fasciae. The velvety-black antenna-orbital areas are pupillated by a niveous spot which is very conspicuous.

The following records are of a variety having the mesonotum distinctly vittate, and the light spot above the velvety-black orbital area is not niveous, but rather ochraceous.

[8] Entom. Mitteil., XIII, p. 89, 1924.

UGANDA: Kampala, VI 20; Ndala, X 26, (H. Hargreaves), [IIE, 2]. GOLD COAST: Teimang, II 22, (L. Lamberlis), [IIE, 1].

Paralimna (Paralimna) vansomereni Cresson

1933. *Paralimna vansomereni* Cresson, Ann. Mag. Nat. Hist., (10), XI, p. 25. [Kenya.]

UGANDA: "Nkokongieru," XII 23–27, (G. L. R. Hancock), [IIE, 1]. BELGIAN CONGO: "W. Ruwenzori" 6000 ft. alt., VII, (G. V. L. Van Someren), [IIE, 2].

Similar to *confluens* but the wing maculation is limited to clouds over the crossveins and on the fourth vein between the two crossveins.

Paralimna (Paralimna) mackieae new species

Very similar to *Paralimna confluens* Loew 1862, but the usual brown color is almost black, and the wing maculation is that of *P. vansomereni* Cresson, 1933, in that the fuscous markings are over the crossveins and the appendages.

Besides the halteres, the only pale color (yellowish) is that of the mid and hind tarsi. The frontal and facial markings and color are as in *confluens*, as are also the markings of the thorax and abdomen. The wings with costa II about twice as long as III; vein II with appendages (in the type) in marginal cell and there is an extraneous crossvein between veins III and IV midway between anterior and posterior crossveins. In general, the wing is infumated, with darker clouds over the crossveins and appendages and these are accompanied by hyaline areas, or, in certain aspects, niveous areas, the largest in the apical portion of discal cell. The general infuscation is also otherwise slightly diluted in various places. Length, 3.5 mm.

TYPE.—Male; Montagu Pass, Cape Province, South Africa; November 1931; (Miss A. Mackie); [British Museum (Natural History) Collection].

PARATYPES.—1 ♂, 2 ♀; topotypical.

Paralimna (Paralimna) approximata new species

A robust species of the present group, with a sharp carina between the bases of the antennae; the niveous spots on the frons are close together, separated by the rugulose anterior part of the mesofrons; the fuscous spots in the wings are large and irregular in shape.

The type is somewhat shrunken, probably from having been immersed in alcohol, so that much of the ground color of the thorax, abdomen and legs is bleached to brownish. The halteres are white and the mid and hind tarsi were probably yellowish.

General color of the vestiture is ochraceous and brown, excepting the large velvety-black anterior frontal area limited above at orbits by a white spot, and contains two niveous spots; these black areas are separated by the rugulose anterior part of the mesofrons; also excepted are the white face and clypeus; cheeks and mesopleura medianly, the lateral margins of the scutellum and lateral margins of tergites II to IV, are cinereous. Wings fuscous with the following intervenous white spots: costal cell except apex, two in marginal and at base, basal third and two distad in submarginal, one each side of anterior crossvein, one in posterior cell above posterior crossvein containing a round fuscous spot and apical spot in first posterior, basal and apical spot in discal, two small at posterior crossvein, one small at apex of second posterior, and some irregular spots in third posterior.

Head slightly higher than long, about as broad as high; frons in profile slightly convex; face in profile long, slightly convex, with prominent sharp carina between antennae. Cheeks almost .5 height of eye. Setation imperfect; fore femur with weak flexor cilia. Length, 3.6 mm.

TYPE.—Male?, "Kamerun, Africa"; ("from R. Thaxter"); [Museum of Comparative Zoology].

Subgenus **Phaiosterna**

1916. [*Paralimna*] *Phaiosterna* Cresson, Trans. Amer. Ent. Soc., XLII, p. 104.

Paralimna [Phaiosterna] limbata Loew

1862. *Paralimna limbata* Loew, Oefver. K. Svenska Vet.-Akad. Forh., XIX, p. 13. ["Caffraria."]

1929. *Paralimna limbata,* Cresson, Trans. Amer. Ent. Soc., LV, p. 188. Note.

BELGIAN CONGO: Sakania, IX, 1931, (Miss A. Mackie), [IIE, 1 ♀].

This species is recognized by the dark median and orbital stripes on the frons, the dark median mesonotal stripe, and the dark posterior crossvein.

The species has been recorded by Becker[4] from Renk and Tonga, Egyptian Sudan, (Ebner), [Vienna]. I have seen a specimen of that series, a female, which, although agreeing well with Loew's description, I am not sure it is his species. I give

[4] Denksch. Akad. Wissen. Wien, XCVIII, p. 72, 1922.

a brief description of that specimen, that was drafted when I had it in hand in 1929, but has since been returned to the Vienna National Museum.

Third antennal segment rather pale with short pile; base of all tarsi also pale. General color of the vestiture on the dorsum, ochraceous as is that also on the face; frons with a brown median stripe through the ocelli and a similar stripe above the frontals along the orbits; frontorbital spot faint. Mesonotum with median and two lateral brown stripes, also similar stripe on upper margin of mesopleural, but otherwise the pleura is not much darker than the mesonotum. The gray fasciae of the abdomen, covering about .5 of the tergites, interrupted medianly by the brown wedges to the margin, the line of demarcation being sharp. Wings hyaline with dark veins and posterior crossvein clouded.

Frons slightly broader than long; face longer than broad, vertical in profile; parafacies narrow, not dilating ventrad; facialia not much broader, setulose, with two stout bristles; cheek about .2 height of eye, the latter round. Antennae about on center-line of eye, and about on that of the head; second segment normal; third 2.5 as long as broad; arista with nine hairs. Third costal section almost .5 as long as third section of fourth vein. Length, 3 mm.

Species incertiae

Paralimna dasycera Bezzi, Boll. Soc. Ent. Ital., XXXIX, p. 188, 1908. [Eritrea. ♂.]

I cannot recognize this species among the material studied. It may be conspecific with *nubifer* Cresson.

Paralimna fulvipes Bezzi, Ann. Soc. Ent. Belg., LII, p. 387, 1908. [Kinchassa, Belgian Congo. ♀.]

This species is also unknown to me. If it is a *Paralimna* it is unique in having the antennae, palpi and legs yellow.

Key to the Ethiopian Species of the Genus Paralimna

1. Frons with an anterior opaque velvety-black area which sometimes contains a niveous spot.....10
   Frons without such opaque area.....2
2. Face, in profile, convex, rather rounding into the somewhat convex frons, and with retreating epistoma, but without pronounced interfoveal hump.....3
   Face, in profile, bold, large, forming almost a right angle with the subhorizontal, comparatively flattened, frons, falling almost vertically to the somewhat pronounced epistoma, with a rather distinct hump at interantennal carina.....7

3. Small (3 mm. long), almost unicolorous, blackish species without irrorations; posterior crossvein clouded; mesonotum with a broad, dark, median stripe; legs black with tarsi hardly paler.
(Phaiosterna) limbata Loew

Larger, brownish and cinereous species, generally abundantly irrorated with brown; wings immaculate....4

4. Mesopleura and generally the bucca cinereous....6
Mesopleura and generally the bucca dark brown....5

5. Face dull whitish or plumbaceous; mesonotum at most faintly vittate and irrorated; lateral margins of scutellum for the most part, cinereous; abdomen opaque, cinereous and brown, the apical tergites at most slightly shining in the male; tarsi black; wings slightly infumated....**nigripes** Adams

Face rather sericeous, mottled yellowish and brownish; mesonotum distinctly vittate and irrorated; lateral margins of scutellum for the most part cinereous; abdomen, particularly in the male, shining apicad, the gray pattern often becoming obsolete; tarsi slightly to much paler than tibiae....**puncticollis** Becker

Face entirely except parafacies brown or ochraceous brown; mesonotum somewhat vittate, the brown areas extensive, with little or no irrorations; lateral margins of scutellum shining black; abdominal brown fasciae rather shining; tarsi black or extreme base paler, with pale flexor scopa; wings strongly infumated.
nidor Cresson

6. Postflexor cilia of fore femur consists of closely set setae, particularly noticeable in the males....**setifemur** Cresson

Fore femur without conspicuous postflexor cilia...**bona** Cresson
adversa Cresson

7. Pleura and generally the bucca, dark....9
Pleura and generally the bucca, cinereous....8

8. Cinereous species with small or no abdominal bands, and irrorations not coalescing....**arabica** Cresson

Dark species with broad abdominal fasciae....**nubifer** Cresson

9. Fore tibia pale; facials weak. (Only females known.)
lamborni Cresson

All tibiae black, at most pale only at extremities; facial and buccal bristles long and slender, the latter extending far beyond face (in profile)....**lynx** Cresson

10. Wings with fuscous intervenous bars or other shaped marks....12
Wings immaculate....11

11. Velvety-black frontal area contains a niveous or ochraceous pupil.
pupulata Cresson

Velvety-black area without such pupil....**albonotata** Loew

12. The frontal niveous spots are nearer each other than to the orbits; mesofrons between the niveous pupils rugulous.
approximata new species

The niveous pupils nearer the orbits than to each other; mesofrons not rugulous.....13
13. Wings with numerous intervenous fuscous bars....**confluens** Loew
Wings with only the crossveins and an intermediate spot on vein IV, fuscous.....14
14. Wings with large white areas between the clouds over the crossveins.....**mackieae** new species
Wings without such white areas.....**vansomereni** Cresson

NOTIPHILA

1813. *Notiphila* Fallen, K. Svenska Vet.-Akad., Handl., 1813, p. 348.

Under this genus eight species have been described from Africa; five of these from southern localities; the other three from "Egypt." Of the latter, *splendens, nigripes,* and *rufitarsis,* by Macquart [5] are so inadequately described that it is impossible to determine even their generic status, and, lacking more definite localities, whether they are Ethiopian or Palaearctic species. Of the five species from southern Africa, two are synonyms and the other three are recognized in the material before me. It will be noted that the several species with south to north distribution through Rhodesia, Tanganyika, Kenya, Abyssinia, Egyptian Sudan to Eritrea, are in accord with other animals in what is termed the East and South African Subregion as distinct from that of the more humid and forested West African Subregion.

Subgenus **Agrolimna**

1917. *Agrolimna* Cresson, Trans. Amer. Ent. Soc., XLIII, p. 48.

Notiphila (Agrolimna) venusta obscuricornis Loew

1862. *Notiphila obscuricornis* Loew, Oefver. K. Svenska Vet.-Akad., XIX, p. 12. [South West Africa.]
1905. *Notiphila varitarsis* Adams, Kans. Univ. Sci. Bull., III, p. 177. [Rhodesia.]

Bezzi [6] records this form from Eritrea, but I have not seen it from that far north.

CAPE COLONY: Port Elizabeth, II 29, (H. K. Monro), [TM, 1]. RHODESIA: Vumba, Umtali, V 1, (A. Mackie; J. Ogilvie); Battery Spruit near Umtali, V, (J. Ogilvie); [all IIE, 9]. NYASALAND: (A. S. Stannus), [IIE, 2]. KENYA: Laikipia Plateau,

[5] Dipt. Exot., Suppl., IV, p. 302, 1850.
[6] Bull. Ent. Soc. Ital., XXXIX, p. 188, 1908.

west of Upper Guaso River, 17 kilometers west of Nanyuki, 6000 ft. alt., VII 8, (J. A. G. Rehn; G. Vanderbilt Exp.), [ANSP, 2]. "Meru," VII, (V. G. L. Van Someren), [IIE, 2]. Sultan Hamud, Emali Range, 4900–5900 ft. alt., III, [IIE, 1]. UGANDA: Nasaka, X 14, (G. L. R. Hancock; in swamp), [IIE, 1].

This is a form of *venusta* having the third antennal segment rather pale; the abdominal fasciae attaining the apices of the tergites medianly, and the hind tarsi infuscated distomedianly.

The synonymy of *varitarsis* is based on the examination of "cotypes" of that species in the University of Kansas Collection.

A male from Naivasha, Kenya, "9, '39," (H. J. A. Turner), [IIE], is probably of this subspecies but has no vittation on the mesonotum, and is cinereous at the humeral angles; the abdominal dark fasciae do not attain the apices of the tergites medianly except faintly on the fourth segment, and the fifth is entirely cinereous.

Notiphila (Agrolimna) venusta subsp. **kenyaensis** new subspecies

This is separable from the typical form of Southern Europe in having the antennae entirely black; abdominal fasciae not (♂) or seldom (♀) attaining the apices of the tergites medianly, and the hind tibiae entirely pale.

Basic color black. Pale, orange to yellow are the: palpi, halteres, apices of femora, fore tibiae and their tarsi, entire mid and hind tibiae, mid and hind tarsi except apices, costa and most of the veins. Wings immaculate; abdomen entirely black.

Entirely opaque, the vestiture olivaceous on the frons and mesonotum, becoming cinereous on lateral and ventral surfaces. Face white; abdominal tergites with paired trigonal brown basal spots which do not attain apices medianly. Frons, at most with faint discolored frontalia. Mesonotum faintly vittate and mesopleura dark dorsad.

Structurally similar to the Palaearctic *venusta* Loew, 1856, but face with four to five hair-like facials; antenna III somewhat longer than broad; aristal hairs eight to ten. Mid tibia with two to three proximal and one apical, weak, extensors. Length, 3.3 mm.

TYPE.—Male; between Nanyuki and the Upper Guaso Nyiro River, North Nyeri District, Kenya Colony; July 7, 1934; (J. A. G. Rehn; G. Vanderbilt Exped.), [ANSP, no. 6675].

PARATYPES: 3 ♂, 6 ♀; with same data as for type. 1 ♂; Upper Guaso Nyiro River, 14 miles west of Nanyuki, North Nyeri-

Laikipia District, Kenya Colony, July 8, 1934, (J. A. G. Rehn; G. Vanderbilt Exped.).

In addition to the above but not considered paratypes I have seen from Kenya: 1 ♀, "Kapeti, Kapeti Plains," IV 26, (F. J. Anderson); 1 ♀, "Meru," VII, (V. G. L. Van Someren), [all IIE, 2].

Notiphila (Agrolimna) bipunctata Loew

1862. *Notiphila bipunctata* Loew, Oefver. K. Svenska Vet.-Akad., XIX, p. 12. [Southwest Africa.]

NATAL: Weenen, XI, III, (H. P. Thomasset), [IIE, 1]. TRANSVAAL: Barberton, De Kaap, X, (H. K. Munro): Premier Mine, Callinan Co., IV 11, (H. K. Munro); Pretoria, I 1, 28, II 27, (H. K. Munro), [all TM, 8]). Kruger National Park, X, (T. D. A. Cockerell, [IIE, 1]. RHODESIA: Salisbury, V, (F. L. Snow; in swamp, 5050 ft. alt.), [KU, 1]. Umtali, South Rhodesia, IX 27, (A. Cuthbertson), [IIE, 1]. WEST DARFUR: E. Jebel Murra, Kirima, 5525 ft. alt., V 20, (M. Steele), [IIE, 1].

This species is easily distinguished by the two round velvety-black spots at the vertex.

Subgenus **Notiphila**

1917. [*Notiphila*] (*Notiphila*) Cresson, Trans. Amer. Ent. Soc., XLIII, p. 31.

Notiphila (Notiphila) ignobilis Loew

1862. *Notiphila ignobilis* Loew, Oefver. K. Vet.-Akad., Forh., XIX, p. 12. [South Africa.]

1905. *Notiphila confinis* Adams, Kans. Univ. Sci. Bull., III, p. 178. [Southern Rhodesia.]

This species was originally based on a series of both sexes from three different localities in South Africa: "Cape of Good Hope," "Caffraria" and "Swakop." *Notiphila confinis* was described from Salisbury, Southern Rhodesia. I have seen several "cotypes" of *confinis* which are in such agreement with others of the series cited below, that I do not hesitate to consider all conspecific, and in agreement with the description of *ignobilis*.

The following diagnosis will aid in recognizing this species:

Second antennal segment and most of the third, orange yellow; arista with nine to eleven hairs. Face with two to three strong facials. Cilia of poste-

rior orbit small, extending as a series of four to five ventrally inclined setulae, to buccal bristle. The brown spots or dots at bases of thoracic macrochaetae small and those at bases of the scutellar setulae indistinct; the marks on mesopleura and the brown basal marks on tergites, not sharply defined. Fore tarsi and most of their tibiae normally dark, but sometimes tibiae are entirely pale; all flexor pile of hind metatarsus black. Tergites III and IV with four spots, sometimes indistinct, of which the median pair are narrow and extend more distad; rarely are they joined with lateral spots on III. Length, 3.8 mm.

RHODESIA: Chilanga, VI 13, (R. C. Wood; on bare ground), [IIE, 1]. TRANSVAAL: Pretoria, I 19, 24 (H. K. Munro); [TM, 3]. Louis Trichardt, IV, (Miss Mackie), [IIE, 1]. BELGIAN CONGO: Albertville, IX, (J. Ogilvie), [IIE, 2]. KENYA: Meru, VII, (V. G. L. Van Someren); Nairobi, VII, (all V. G. Van Someren); Kabete, IV 16, (T. J. Anderson); [all IIE, 5]. WEST DAFUR: Jebel Murra, 7000 ft., IV 7, North Jebel Murra, Killing, VI 29; South Jebel Murra, Kallikitting, 4450 ft., VI 7, (all Miss M. Steele); [all IIE, 3].

There seems to be no marked differences in the West Darfur specimens, which, however, are not in perfect condition.

Notiphila (Notiphila) pokuma new species

Similar to *ignobilis* but averaging larger; the third antennal segment less infuscated apically; arista with fourteen hairs; cilia of the posterior orbit stronger, with the series of seven ventrally inclined setulae to buccal bristle; macrochaetae and marginal setulae of the mesonotum and scutellum with distinct brown dots at their bases, the brown spots on the mesopleura and the brown basal fasciae on the tergites are sharply defined. With the exception of the pencil of several basal setae, the flexor pile of the basal part of the hind metatarsus is yellow.

Yellow ground color as follows: antenna III, palpi, halteres, apices of femora, fore tibiae, mid and hind tibiae and tarsi, and wing veins. Fore tarsi slightly infuscated.

Opaque; general color of vestiture olive buff dorsad, becoming cinereous ventrad; variegated with buffy brown marks and dots. Frontalia blackish. Face pale olive buff, almost white, with dark median spot. Mesonotal and scutellar macrochaetae with large brownish spots at bases and some of the scutellar setulae with similar colored dots; mesopleura with a large dark mark on upper part. The basal fasciae of the tergites are sharply defined, leaving narrow marginal and mesal lines of lighter color, the latter forming

a complete longitudinal grayish stripe; the isolated bristles and setae with dark spots at bases. Coxae and femora cinereous.

Head slightly broader than high (as 6:4), much higher than long (as 4:2.5). Frons broader than long (about as 3:2), about .5 width of head; orbits about parallel. Face about .4 width of head, slightly longer than broad; in profile almost straight and slightly retreating ventrad; interfoveal carina broad and low, but foveae distinct, flattened mesally, ventrad of carina; about three strong facials, of which the upper two are well above line of buccal orbit, the facialia otherwise sparingly setulose well dorsad. Cheek about .2 height of head with strong bristle, with which the strong cilia of posterior orbit is connected by a series of seven ventrally inclined setulae. Third antennal segment twice as long as broad; arista with fourteen hairs.

Mesonotal setulae rather scattered, not seriated in the acrostichal region. Abdomen ovate, rather densely setulose, setae at apical margin very long on distal tergites; tergite V not noticeably turgid. Legs rather densely setulose; postflexor cilia of fore femur consists of four to five long setae, longer than diameter of femur; no distinctive flexor ciliation on mid femur, but the setae on anterior surface distally are very strong. Wings rather broad; costal section III slightly shorter than section III of vein IV (as 3:4); posterior crossvein straight, its extension would intersect costa just basad of tip of vein II. Length, 5.4 mm.

TYPE.—Female; Pokuma, Sierra Leone; (E. Hargreaves, "3, 11, 25"; "river bank"); [British Museum (Natural History)].

A male from Kampala, Uganda, (C. C. Gowdey; "XI, 17, 1915; no. 5545"), [IIE], may be conspecific but is not considered a paratype. It has the third antennal segment slightly darker apically and the arista has ten to eleven hairs; the mesopleural mark is smaller and the brown marks on the tergites are not so sharply defined, forming four longitudinal series of spots, the median pair attaining the apices of the tergites. The wings are more elongate, with the third costal section much shorter than the ultimate section of the fourth vein. The postflexor setae of the fore femur are not so strong, and are scarcely longer than the diameter of the femur.

Additional series of this species are:

KENYA: Meru, VII, (V. G. L. van Someren); Nairobi, VII, (V. G. L. Van Someren); Naivasha IX, (H. T. A. Turner); [all IIE, 3]. UGANDA: Kampala, IX 11, (G. L. R. Hancock), [IIE, 1]. BELGIAN CONGO: "Elizabethville," IX 11, (T. Ogilvie), [IIE, 2].

Notiphila (Notiphila) cana new species

Similar to *pokuma* but almost entirely cinereous.

Pale (yellowish) are the following: antenna II (III missing), palpi, apices of femora, entire tibiae and tarsi, basal scopa of hind metatarsus, and wing veins. Short basal flexor seta of hind metatarsus, black.

Entirely cinereous except dorsum of mesonotum and scutellum, and faint median spots on tergites, all of which are brown; irrorations faint or absent. Face niveous.

Face broad, with three facials, all below line of buccal orbits, cheeks about .25 height of head. Length, 3 mm.

TYPE.—Female; Kabalo, Belgian Congo; August 15, 1931; (W. P. Cockerell); [British Museum (Natural History)].

Key to the Ethiopian Species of the Genus Notiphila

1. Facials fine, hair-like, in series generally to well above line of buccal orbit; mid tibiae with apical extensor present; palpi pale (Subgenus *Agrolimna*) ..... **venusta obscuricornis** Loew
   venusta kenyaensis new subspecies
   bipunctata Loew

   Facials strong, in series confined to lower part of facialia; mid tibiae without apical extensor (Subgenus *Notiphila*) 2
2. Vestiture almost entirely cinereous except middle of mesonotum and some abdominal spots, and the faint irrorations if present.
   cana new species

   Vestiture more ochraceous in color 3
3. Irrorations on mesonotum and scutellum very faint or absent; fore tarsi dark; basal flexor scope of hind metatarsus black.
   ignobilis Loew

   Irrorations on mesonotum and scutellum quite pronounced; fore tarsi pale; basal scopa of hind metatarsus pale, but basal seta is black.
   pokuma new species

Tribe TYPOPSILOPINI

1946. Typopsilopini Cresson, Trans. Amer. Ent. Soc., LXXII, p. 239.

TYPOPSILOPA

1916. *Typopsilopa* Cresson, Entom. News, XXVII, p. 147.
1926. *Psilopina* Becker, in Lindner's Flieg. Pal. Reg., fam. 56, p. 38. New synonymy.

Typopsilopa electa (Becker)

1903. *Ephygrobia electa* Becker, Mitt. Zool. Mus. Berlin, II, p. 159, pl. IVb, fig. 23. [Egypt.] New syn.

1922. *Psilopa polita* Becker (not Macquart, 1835), Denksch. Akad. Wissen. Wien, XCVIII, p. 72. [Atbara, Egyptian Sudan.]
1929. *Typopsilopa tonga* Cresson, Trans. Amer. Ent. Soc., LV, p. 194. [Egyptian Sudan.] For *polita* Becker, not Macquart. New syn.
1926. *Psilopina electa* Becker, in Lindner's Flieg. Pal. Reg., fam. 56, p. 38, fig. 37.

KENYA: Nairobi, VII, (V. G. L. Van Someren), [IIE, 1].

PSILOPOIDEA

1939. *Psilopoidea* Cresson, Notulae Nat. Phila., no. 21, p. 8.

Psilopoidea howardi Cresson

1919. *Psilopoidea howardi* Cresson, Notulae Nat. Phila., no. 21, p. 9. [Mozambique.]

A pale, yellowish species with well-developed postsutural dorsocentrals and supra-alar, but no antesutural dorsocentral. The facials are weak, almost hair-like. Antennae, tibiae and tarsi are yellow.

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DESCRIPTIONS AND RECORDS OF NORTH AMERICAN TRICHOPTERA, WITH SYNOPTIC NOTES

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(Plates 2–8)

It seems evident that zoogeographic studies of North American caddis flies will not be well founded until a greater proportion of the fauna is known. This is especially true of the peripheral species of the Nearctic region. I have been fortunate in obtaining additional quantities of material from the southeastern United States, and from several sections of the southwest, including central and northern Mexico. This material has served to fill out several blanks in our knowledge of the fauna of those regions. Unless otherwise stated, types from this material are in the collection of the Illinois Natural History Survey.

At this time I am taking the opportunity of recording additional caddis fly material in the collections of the Academy of Natural Sciences of Philadelphia. For the most part this material represents locality records of species for which little distributional data is known.

Of especial interest has been the discovery, among collections of the Academy, of material of two long-described species which have been poorly understood to date. The two species are *Atopsyche tripunctata* Banks and *Micrasema scissum* McLachlan. The Academy's specimens of the former have led finally to a settlement of the misplaced genus *Ventrarma* of Navas, which has been a perplexing problem since its description. The specimens of *M. scissum* have reopened the entire question of generic concepts of Nearctic Brachycentridae, necessitating the reassignment of several Nearctic species.

I wish to express my appreciation to Mr. E. T. Cresson, Jr., for making available to me for study the Academy collections.

To Mrs. R. E. Maxwell, Illinois Natural History Survey, I wish to convey my thanks for help with the illustrations.

Family Rhyacophilidae

Rhyacophila oreia new species (Pl. II, fig. 1.)

This species differs markedly from all known Nearctic species in the structure of the genitalia. The lateral aspect of the claspers is reminiscent of the Japanese species *lacrimae* Tsuda but *oreia* differs from *lacrimae,* as well as from all the described Nearctic species, in the long finger-like mesal process of the basal segment of the clasper.

Male.—Length 5.5 mm. Head and body dark chocolate brown; antennae, palpi, and legs slightly lighter brown; wings uniformly light brown. General structure typical for genus. Genitalia as in figure 1. Ninth segment almost annular and only slightly narrower ventrad than dorsad. Tenth tergite very short, forming a pair of ovate lobes which are fused on the meson for half their length. Clasper distinctly two-segmented; the basal segment short and deep, wider than long, and bearing on its ventral mesal edge, fig. 1B, a long, flat, parallel-sided process which is two-thirds as long as the apical segment; apical segment having a short angulate dorsal portion, but with the apico-ventral corner attenuated into a long narrow process curving slightly dorsad. Aedeagus small, fig. 1A, broad at base and consisting of a broad ventral platform and a narrow sclerotized process above it, the two closely appressed and forming a structure which is sinuate in lateral aspect.

Female.—Length 6 mm. Color and general structure similar to male. Eighth segment more heavily sclerotized than seventh, forming an irregular cylinder which is broad at base and tapers markedly towards apex.

Holotype.—Male; Dunraven Pass, Mt. Washburn, Yellowstone National Park, Wyoming; August 2, 1940; (T. H. Frison and T. H. Frison, Jr.).

Allotype.—Female; same data as for holotype [INHS].

Paratypes.—6 ♂, 2 ♀; same data as for holotype. Paratypes are deposited in the collections of the Academy of Natural Sciences of Philadelphia and the Illinois Natural History Survey.

This distinctive species was collected along a small stream near timber line on Mt. Washburn.

Rhyacophila malkini new species (Pl. II, fig. 2.)

The produced and constricted ninth tergite is similar in many respects to the condition found in *vedra* Milne, to which this species

is most closely related; *malkini* differs from *vedra* in various details of the shape of the tenth tergite and claspers, and strikingly so in the structure of the aedeagus, especially the spined apex of its ventral process.

MALE.—Length from tip of head to end of folded wings 12 mm. Color a mottling of somber shades of gray brown, except the venter and legs which are straw color. General structure typical for genus, including palpi, spurs, and wings. Genitalia as in fig. 2. Ninth tergite narrow ventrally and large dorsally, the dorsum produced into a long process overhanging the claspers, this projection concave at the sides, narrow and rounded at the apex, and provided on each side near apex with a narrow shelf-like flange. Tenth tergite composed of a pair of upper setate lobes, each merging into a narrow head-like sclerite, below which is a pair of sclerotized lobes fused on the meson to form a horseshoe-like structure. Clasper having a long, broad, apical segment and a moderately short, irregularly shaped, apical segment that bears several patches of minute spines on its inner face. Aedeagus, fig. 2A, composed of a large sclerotized base and two sclerotized processes; the base is produced into a long dorsal projection much narrowed at apex; the upper process projects just beyond the latter structure and is composed of a flat dorsal plate and a vertical keel-like flange, the keel and flange separated from each other at apex by a deep incision; ventral process elongate and almost cylindrical at its apex, bearing on each side a row of about ten spines forming an evenly spaced comb.

Holotype.—Male; Eugene, Oregon; September 26, 1946; (B. Malkin).

Rhyacophila bifila Banks

BRITISH COLUMBIA: Rogers Pass, Aug., 1908, 1 ♂, [ANSP].

ATOPSYCHE Banks

1905. *Atopsyche* Banks, Amer. Ent. Soc. XXXII: 17. Genotype, monobasic.—*Atopsyche tripunctata* Banks.

1924. *Ventrarma* Navas, Broteria, Serie Zoologica XXI: 76. Genotype, by original designation.—*Ventrarma implexa* Navas.

The genus *Ventrarma* was described by Navas with two included species, accompanied by illustrations of venation and male genitalia. The genus was placed by Navas as close to *Wormaldia* (belonging to the family Philopotamidae), and this has constituted our knowledge of the situation to the present. In the collection of the Academy of Natural Sciences of Philadelphia there are a male and female of *Atopsyche tripunctata* Banks, and in Mexican material received from Mr. Harry Hoogstraal two additional species

in this complex. A study of the venation and genitalia of these specimens indicates that they are extremely similar to, and indubitably congeneric with, the two species which Navas described as *Ventrarma*. This removes *Ventrarma* from the Philopotamidae and places it as a synonym of *Atopsyche* in the Rhyacophilidae.

The two species collected by Hoogstraal appear to be undescribed and these bring to six the number of continental *Atopsyche* known from the region extending from the southwestern United States to Central America. In the following key, which is presented for the separation of these forms, the species described by Navas and Ulmer are placed on the basis of illustrations of genitalia in the original description.

Key to Atopsyche Species of Continental America

1. Clasper with a ventral branch, fig. 4.....2
   Clasper without a ventral branch, fig. 3A.....3
2. Ventral branch of clasper originating near middle of clasper (Navas 1924, p. 77, fig. 14); known from Costa Rica.....**implexa** (Navas)
   Ventral branch of clasper arising near apex, fig. 4; known from Mexico.....**majada** new species
3. Clasper slender, constricted in middle and slightly clavate at apex (Navas 1924, p. 78, fig. 15); known from Costa Rica. **callosa** (Navas)
   Clasper nearly parallel-sided or not at all constricted in middle, figs. 3, 5.....4
4. Apical segment of clasper angulate and boot-shaped (Ulmer 1905c, fig. 146); known from Brazil, Panama.....**longipennis** (Ulmer)
   Apical segment of clasper straight, deviating little from the contours of the basal segment, figs. 3, 5.....5
5. Aedeagus blunt, without dorsal sclerotized processes; paracercal process (*pc*) incised dorsally at tip to form an upturned, pointed apex, fig. 5.....**erigia** new species
   Aedeagus bearing a pair of dorsal processes, each heavily sclerotized and forked; paracercal process (*pc*) sinuate and shaped like a swan's neck and head, fig. 3.....**tripunctata** Banks

Atopsyche tripunctata Banks (Pl. II, fig. 3.)

The male genitalia of this species differ in several particulars from other members of the genus. The paracercal process has a form like a swan's neck and head. The aedeagus bears an internal sclerotized rod which is curved at the base; in addition the aedeagus has two pairs of processes, a dorsal forked process near the apex and a finger-like pair near the base. The claspers are fairly straight with a narrow apical segment set off from the basal segment by a definite suture.

Two specimens in the Academy collection represent this species; both are from the type locality and were collected by H. Skinner in August, 1905, one bearing the data, "Huachuca Mts., Arizona," and the other bearing the locality, "Carr Canyon, Huachuca Mts., Cochise Co., Arizona."

Atopsyche erigia new species (Pl. II, fig. 5.)

This species is considerably smaller than the genotype, which has a length of 12 to 13 mm. In addition, *erigia* differs from it in many characters of the genitalia.

MALE.—Length 7 mm. Color various shades of brown, the legs slightly paler than the body and the wings with small irregular pale dots over much of their area. General characteristics as for genus. Genitalia as in fig. 5. Ninth and tenth tergites apparently combined, forming a pair of large membranous structures concave laterally, which extend over most of the genitalia. Ninth sternite small, bearing a long slender cercus which has a scattering of long setae at apex, and a paracercal process which is upcurved and bears a dorsal tooth and indentation some distance before apex. Clasper long and slender, the basal segment over twice as long as wide, the apical segment evenly tapering and rounded at apex, little more than one-half the length of the basal segment. Aedeagus broad and sinuate, truncate at apex, and bearing an internal curved sclerotized rod.

Holotype.—Male; Hacienda Santa Engrecia, Tamaulipas, Mexico; March 9, 1939.

Paratype.—Some data as for holotype, 1 ♂ [ANSP].

Atopsyche majada new species (Pl. II, fig. 4.)

Externally this species is extremely similar to *erigia* Ross, but differs in many details of the male genitalia.

MALE.—Length 6.5 mm. Color various shades of light brown, with legs paler and the wings irregularly spotted with light marks as in the preceding species. Genitalia as in fig. 4. Ninth and tenth tergites united, forming a pair of large membranous lobes that are concave laterally. Ninth sternite small, bearing a very long and slender cercus and a stout paracercal process, the latter with a deep dorsal excavation near apex which forms a dorsal point at the tip. Clasper with scarcely any indication of segmentation, the tip incised to form a long dorsal lobe and a shorter ventral lobe, the two somewhat parallel sided and rounded, and held very close together. Aedeagus broad at base and tapering to a narrow, broadly rounded apex, bearing a curious sclerotized rod which has a long straight dorsal arm and a curved ventral arm.

Holotype.—Male; moist jungle, La Majada, Apatzingan, Michoacan, Mexico; August 12, 1941; (H. Hoogstraal).

Glossosoma pterna new species (Pl. II, fig. 6.)

The elongate and sinuate cercus places this species in the *alascense* group, in which it is most closely related to *pyroxum* Ross. From this latter species, however, *pterna* differs in having the sclerotized lateral lobes of the tenth tergite forming only shallow straps, in having the clasper constricted to form a stem-like neck near the base, and in having a large "heel" near the base of the cercus.

MALE.—Length 8 mm. Color various shades of light brown, the venter of the body and all the legs straw colored. General structure typical for the subgenus *Glossosoma,* distinctive characters apparently confined to the genitalia. Genitalia as in fig. 6. Ninth segment with the lateral margins produced into flaps which form a hood-like covering for the rest of the genitalia. Tenth tergite having a pair of large mesal membranous lobes and a pair of lateral sclerotized lobes, each of the latter forming a shallow strap. Cercus elongate, having a large heel-like base, from the ventral part of which there extends a long curved sclerotized rod, tapering evenly to a sharp tip, and bearing on its basal portion a few short scattered setae. Clasper membranous, consisting of a short broad base, a short and very narrow neck, and beyond this a somewhat ovate apical portion bearing a few setae. Aedeagus elongate and somewhat cylindrical, its apex bearing an area of membranous folds; from the ventral portion near the base extend a sclerotized rodlike structure and a pair of short finger-like processes each bearing a cluster of long setae at its tip.

FEMALE.—Length 8.5 mm. Color light brown, similar in this and in general structure to male. Sixth sternite with a sharp sclerotized projection near the apical margin. Eighth segment wide at base and tapering to apex. Apical margin truncate on venter, slightly incised on dorsum.

Holotype.—Male; Waddell Creek, Santa Cruz, California; August 12, 1933.

Allotype.—Female; same data as for holotype.

Paratypes.—1 ♀; same data as for holotype [ANSP].

Glossosoma schuhi new species (Pl. II, fig. 7.)

The long, finger-like basal seta of the cercus places this species in the *traviatum* group, and the narrow base of the clasper and the somewhat U-shaped aedeagus indicate a close-relationship with the species *traviatum* Banks. From this latter species *schuhi* differs in having the apex of the clasper tapering evenly to a pointed and slightly upturned apex; in *traviatum* the clasper is longer and the apex is strikingly broad and truncate.

MALE.—Length 7 mm. Color dark brown, with the venter and legs lighter shades of brown. General structure typical for the subgenus *Glossosoma*. Genitalia as in fig. 7. Ninth segment with lateral margins produced into large flaps which form a covering for most of the genitalia. Tenth tergite forming a pair of lateral sclerotized lobes which are humped near base, and pointed and hooked at apex; between them are membranous lobes usually not visible from lateral view. Cercus short but broad, bearing scattered setae on the apical portion, and having a large basal spine, the spine with an enlarged base and a long rod-like apex slightly enlarged at extreme tip. Clasper with a narrow and much convoluted base, the apical portion narrower than the base, both its upper and lower margins convex so that it is slightly widest near the middle and tapers evenly from there to a pointed and slightly upturned apex. Aedeagus arising from a shallow basal plate which extends as a narrow projection between the bases of the claspers; the main body of the aedeagus is markedly curved and ends in a large spur-like tip below which are some membranous folds.

FEMALE.—Length 7 mm. Color and general structure similar to male. Apical process of sixth sternite small but pronounced. Eighth segment cylindrical and tapering only slightly to apex, the apical margin very slightly sinuate ventrad and markedly incised dorsad.

Holotype.—Male; Redmond, Oregon; June 1, 1939; (Schuh and Gray).

Allotype.—Female; Deschutes River near Warm Springs, Oregon; May 31, 1941; S. G. Jewett, Jr.

Paratypes.—3 ♂; same data as for holotype. Deposited in the collections of the Academy of Natural Sciences of Philadelphia and the Illinois Natural History Survey.

Anagapetus bernea new species (Pl. III, fig. 8.)

This species differs from *debilis*, the only other known species in the genus, in the short blunt tenth tergite and in having the claspers cleft one-half way to the base.

MALE.—Length 6 mm. Color various shades of dark brown, the legs paler than the body. General structure typical for the genus. Genitalia as in fig. 8. Ninth segment cylindrical, nearly twice as deep as long, and bearing on each side a cluster of curious setae each of which has the tip slightly expanded and round. Tenth tergite divided into two lobes, each shorter than deep, covered laterally with scattered setae and bearing a sclerotized ridge along the mesal margin. This ridge is produced into a small but sharp tooth near its apex, the apex of this tooth projecting just below the latero-ventral margin of the tergite. Clasper large, with a curved narrow base, expanding beyond this into a large flat portion which is deeply incised to form a dorsal and ventral process, each finger-like and narrow, the upper

one bearing at its tip a pair of stout setae. Along the mesal margin of each clasper is a curved ridge which ends in a small but sharp sclerotized point. FEMALE.—Length 6 mm. Color and general structure similar to male. Sixth sternite bearing a truncate, low, wide sclerotized process. Eighth tergite bilaterally compressed and similar in form to that of *debilis*.

Holotype.—Male; Oxbow Springs, Hood River Co., Oregon; May 19, 1940; (S. G. Jewett, Jr.).

Allotype.—Female; same data as for holotype.

Paratypes.—2 ♂, 3 ♀; Steven's Pass, Berne, Washington; June 24, 1940; (Charles Ross). Paratypes are in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia. The specimens collected at Berne were taken in a small mountain brook near the summit of Steven's Pass, in the heart of the Cascade Mountains.

Agapetus gelbae new species (Pl. III, fig. 9.)

This species is most closely related to *vireo* Ross, but differs from it in the finger-like prolongation of the postero-dorsal portion of the clasper.

MALE.—Length 5 mm. General color dark brown, almost black, the appendages and warts lighter shades of brown. General structure typical for the genus. Genitalia as in fig. 9. The ninth segment fairly long through the mid-lateral region, tapering dorsally, where it fuses imperceptibly with the tenth. Tenth tergite divided into a pair of sclerotized lobes joined with membranous folds; each lateral lobe is heavily sclerotized except at the extreme base, has the ventral and apical portion more strongly sclerotized and darker, and has the extreme postero-ventral angle produced into a short wide projection. Clasper irregular in shape, the basal portion fairly wide, the postero-dorsal portion elongate, forming a finger-like process; the posterior margin of the clasper beneath this process is slightly serrulate. Along the mesal side of the apex of the clasper is a sclerotized ridge which forms a blunt tooth at its base, and below this tooth is a series of long setae. From ventral view, the clasper is concave, fig. 9A, the bases of the two claspers meeting broadly for a short distance on the meson. Aedeagus forming a simple membranous tube typical for the genus.

FEMALE.—Length 6 mm. Color and general structure similar to male. Genitalia of a simple type typical for the section of the genus to which it belongs, the eighth segment being bilaterally compressed, very heavily sclerotized, and without apparent distinguishing characteristics.

Holotype.—Male; May's Spring, two miles southwest of Bloomington, Indiana; April 25, 1946; (Ricker et al.).

Allotype.—Female; same data as for holotype.

Paratypes.—1 ♂, 3 ♀; same data as for holotype. 5 ♂, 2 ♀, Twin Lakes Spring, a few miles south of the type locality and collected on the same date. Paratypes are in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

This odd species was first collected by Miss Ruth Gelb during the course of a limnological investigation of the small, cold, clear-water stream, issuing from a spring at Twin Lakes. Subsequent collections disclosed that this species is fairly common in this spot and it was found in a similar small brooklet issuing from May's Spring.

Agapetus taho new species (Pl. III, fig. 12.)

This and the following species have the tenth tergite narrowed at the apex to form a pair of long ventral projections and in this characteristic differ from all other known members of the genus. The two species may be readily separated by the lateral aspect of the claspers, that of *taho* being rounded at the apex, fig. 12, that of *ophionis* being incised at apex to form a dorsal shoulder and a ventral projection, fig. 11.

MALE.—Length 7 mm. Color various shades of dark brown, the legs and venter lighter. Genitalia as in fig. 12. Ninth segment short and tubular, narrowed toward the dorsum. Tenth tergite divided into a pair of lateral lobes, each having the basal two-thirds high and somewhat rectangular, constricted beyond this point to form an apical elongate process bearing a group of spurs at its apex. Cercus of moderate length, narrow, and bearing several long setae. Clasper slightly sinuate, widest near base, curved slightly upwards at apex, extreme tip ending in a sharp sclerotized spur pointing mesad; the middle of the upper margin of the cercus also bears a mesal spur which is hidden from ventral view; the ventral aspect, fig. 12A, is broad and the mesal margin sinuate.

Holotype.—Male; Taylor Creek, near Tahoe City, California, September 11, 1932.

Paratype.—1 ♂; same data as for holotype [ANSP].

Agapetus ophionis new species (Pl. III, fig. 11.)

As explained above, this species is most closely related to *taho* Ross, differing from it in the incised condition of the apex of the clasper.

MALE.—Length 7 mm. Color dark brown, the legs and venter lighter. General structure typical for genus. Genitalia as in fig. 11. Ninth segment

short and annular, tapering evenly toward dorsum. Tenth tergite divided into a pair of lateral lobes, each having a flat basal portion beyond which extends a finger-like process bearing at its apex a pair of sclerotized points; two semi-sclerotized rods are discernible in the lobes of the tenth tergite as outlined in the illustration. Clasper moderately long and slender, bearing a sparse row of long marginal setae. Clasper broad from lateral view, narrowest at the base and from that point widening regularly, the apical margin circularly incised to form an acute rounded dorsal shoulder and a long, finger-like, ventral projection; the ventral aspect, fig. 11A, is broad and tapers evenly to apex.

FEMALE.—Length 7 mm. Color and general structure similar to male. Genitalia similar to other members of the genus, with only a moderate incision between the dorsal and ventral portions.

Holotype.—Male; Waddell Creek, Swanton, Santa Cruz Co., California; August 25, 1932.

Allotype.—Female; same data as for holotype.

Paratypes.—All from the same locality as the holotype; August 25, 1932, 6 ♂, 7 ♀; August 30, 1933, 2 ♂, 2 ♀. Paratypes are deposited in the collections of the Academy of Natural Sciences of Philadelphia and the Illinois Natural History Survey.

Family PSYCHOMYIIDAE

Neureclipsis melco new species (Pl. III, fig. 14.)

This species is most closely related to *crepuscularis* (Walker), but differs in the markedly bifid cercus in the male, and in the rectangular eighth sternal plates of the female.

MALE.—Length 6 mm. Color very dark brown, almost black, the abdomen and legs lighter shades of brown. General structure typical for genus. Genitalia as in fig. 14. Tenth tergite short and submembranous, divided into indistinct lobes. Ninth sternite somewhat triangular, its posterior margin forming a wide and somewhat angular projection. Cercus not quite as long as the tenth tergite, and having a broad rounded dorsal lobe and a ventral lobe that is nearly as long as the dorsal one but tapers to a pointed apex. Clasper elongate and slender, upturned slightly at apex. Aedeagus tubular, the basal portion broad, the apex expanded and curved ventrad to form a large ventral lobe.

FEMALE.—Length 6.5 mm. Color almost black, similar in this regard and in general structure to male. Genitalia of a simple type, fig. 14A, the eighth sternal plates nearly rectangular but with the apico-mesal area of each slightly enlarged and rounded.

Holotype.—Male; Tharpe's Pond, 5.5 miles north of Perry, Georgia; March 31, 1945; (P. W. Fattig).

Allotype.—Female; same data as for holotype.

Paratypes.—Cedar Creek, 10.7 miles north of Ellaville, Ga.; April 2, 1946, (P. W. Fattig), 1 ♂; Beaver Creek, 5 miles southeast of Roberta; April 23, 1946, (P. W. Fattig), 3 ♂, 2 ♀. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

It is interesting that this species is apparently a derivative of the *crepuscularis* complex and occurs at the southeastern edge of the range of *crepuscularis*. The latter species is widespread over the northeastern and central states with records south to Tennessee, Kentucky, North Carolina, and Arkansas.

Polycentropus neiswanderi new species (Pl. III, fig. 10.)

The curious cercus places this species in the *maculatus* group, in which it is most closely related to *pentus* Ross. It differs from this species in lacking a projection at the middle of the body of the cercus, and in having a sharp angulation at the point where the apical process of the cercus begins. This latter characteristic separates this species from all other members of the complex.

MALE.—Length 8 mm. Color light brown, the venter and appendages lighter, almost straw color; the wings immaculate. Genitalia as in fig. 10. Ninth sternite narrow. Tenth tergite divided into a pair of elongate processes, each ending in a long slightly curved rod. Cercus with an enlarged basal body and a long tapering apical process which is nearly twice as long as the body; the body is sinuate, narrow, and forms a sharp angulation at the point of origin of the apical process. Clasper with the main ventral portion parallel sided and broadly rounded at apex; the baso-dorsal process is nearly as long as the body of the clasper, slightly spiculate from lateral view and with a large rounded spiculate mesal area, but without any perceptible stalk. Aedeagus narrow, sharply curved ventrad near apex.

FEMALE.—Length 9 mm. Color and general structure as for male. Genitalia practically indistinguishable from those of *pentus*, having narrow and somewhat elyptic eighth sternal plates, and a pair of internal sclerotized pads which are elongate and slightly crenulate; the spermatheca is small and vasiform.

Holotype.—Male; Shawnee Forest, Ohio; June, 1942, in light trap.

Allotype.—Female; same data as for holotype.

Paratypes.—OHIO: same data as for holotype, 6 ♂, 14 ♀. Same data but May, 1942, 13 ♂, 5 ♀. Dean Forest, Lawrence Co., May,

1939, 1 ♂. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

I am indebted to Dr. C. R. Neiswander (for whom this species is named) for the privilege of examining the insect material taken in Ohio light trap collections, in which this species was discovered.

Polycentropus picana new species (Pl. III, fig. 13.)

The pair of sclerotized angled rods of the tenth tergite place this species in the *remotus* group. From all members of this group, *picana* differs in the curious structure of the cercus and its associated sclerites, and in the aedeagus.

MALE.—Length 8 mm. Color an irregular mottling of various shades of medium brown, the legs and venter paler, approaching straw color. General structure typical for genus. Genitalia as in fig. 13. Tenth tergite composed of a mesal and two lateral membranous lobes, and a pair of stout sclerotized processes that are sharply angled ventrad. Cercus forming a large rounded flat lobe associated with a ventro-mesal plate having a pointed dorsal tip and a ventral sclerotized hook which curves mesad. Clasper somewhat ear shaped, the two diverging at almost a right angle. Aedeagus, fig. 13A, irregular and complex, triangular in general outline, beyond the middle having a pair of sclerotized bands, the apical one forming a sharp ventral point and internally bearing two clusters of about four large spines each.

Holotype.—Male; Hacienda Santa Engrecia, Tamaulipas, Mexico; March 9, 1939.

Paratype.—Villa Santiago, Nuevo Léon, Mexico; June 12, 1940; (H. Hoogstraal). [ANSP.]

Polycentropus santiago new species (Pl. III, fig. 15.)

The genitalia of this species are quite different from those of any known members of the Nearctic fauna. It is evidently related to *remotus,* from which it differs in the striking division of the clasper.

MALE.—Length 5.5 mm. Color light brown mottled with irregular flecks of darker brown; legs and venter straw color. General structure typical for genus. Genitalia as in fig. 15. Ninth sternite large and appearing bowl-like and almost semi-circular from lateral view. Tenth tergite with the mesal area divided into membranous lobes and bearing a pair of sclerotized broad lateral processes pointing laterad, each ending in a sharp sclerotized spur-like point. Cercus relatively small, round, and covered with a scattering of long and short setae; the cercus is situated on a sclerotized plate which is pro-

duced meso-ventrad into a long stout sclerotized hook bearing several setae. Clasper divided to base, the two lobes at almost a right angle to each other; the dorsal lobe is elongate, somewhat finger-like, and convex mesad; the ventral plate is much shorter than the dorsal one and from ventral view forms a wide, spiculate truncate flap; the ventral lobes of the two claspers are fused on the meson, fig. 15B, as are their internal attachment rods. Aedeagus, fig. 15A, consisting of a short but deep cylindrical collar containing a sinuate structure having a heavily sclerotized apical portion and bearing internally several long stout angled rods.

Holotype.—Male; Villa Santiago, Nuevo León, Mexico; altitude 2600 feet; June 22, 1940; (H. Hoogstraal).

Paratype.—Same data as for holotype, 1 ♂ [ANSP].

Cyrnellus marginalis (Banks)

TEXAS: 1 ♂.

Cernotina truncona new species (Pl. IV, fig. 16.)

The apical position of the dorsal arm of the clasper, and the more generalized condition of the cercus, indicate a unique position in the genus for this species. It comes closest to *ohio* Ross but differs from it in the characters just mentioned.

MALE.—Length 5 mm. Color light yellowish brown except for the very prominent black eyes; antennae and legs paler than the body color. General characteristics typical for the genus. Genitalia as in fig. 16. Ninth sternite triangular. Tenth tergite divided into a pair of long tapering lobes about as long as the cerci. Cercus broad and finger-like, slightly curved mesad, fig. 16A, and bearing a heavily sclerotized long spur at the apex. Clasper broad at base and apex, constricted near the middle, the apex almost truncate; on the mesal surface of each clasper is a mesal process which is sharply angled, and projects above the clasper as a broad flap bearing a few setae at its apex. Aedeagus forming a membranous tube typical of the genus.

Holotype.—Male; Daytona Beach, Florida; June 27, 1945; (Riegel, Dalesandro, and Rott); collected in light trap at Welsh Hospital.

Family HYDROPSYCHIDAE

Hydropsyche elissoma new species (Pl. IV, fig. 19.)

The curious curved base of the aedeagus indicates a close relationship between this species and *betteni* Ross, from which *elissoma* differs in the sharp angulation of the aedeagus and in the sharp lateral lobe of the tenth tergite.

MALE.—Length 11 mm. Color various shades of brown, the palps, legs, and venter paler, almost straw color; antennae with alternately light and dark brown annulations, the two colors running into each other and the contrast becoming indistinct beyond the middle of the antennae; wings with an irregular irrorate pattern of medium brown and straw color. General structure typical for genus. Eyes small, separated on the meson by a distance equal to twice the dorsal width of an eye. Genitalia as in fig. 19. Ninth segment narrow, with a large lateral lobe on its apical margin, the dorsum forming a high narrow keel below which is a deeply concave area. Tenth tergite divided into a pair of lobes, the dorsal portion of each lobe forming a dense cushion-like brush, the lateral area forming an irregular setose wart and the apex produced into a flat projection, in dorsal view rounded as in fig. 19B, or moderately acutely pointed, appearing as an upturned sclerotized point from lateral view. Clasper elongate, the basal segment slightly enlarged near its apex; apical segment less than half the length of the basal one, tapering to a point and armed with only fine setae, its lateral profile sinuate, first curved slightly ventrad then at extreme tip curved slightly dorsad. Aedeagus extremely long, the extreme basal part curved into a 180° loop, the curve continuing from this point to within one-third of the distance of the apex, at which point the structure is sharply angled and straight from this point to the apex; entire aedaegus tubular and simple, the tip with a slight posterior projection at the dorsum.

Holotype.—Male; Mossy Creek, Perry, Georgia; March 31, 1945; (P. W. Fattig).

Paratype.—GEORGIA: same data as for holotype, 1 ♂; same data but September 7, 1945, 1 ♂. Patsiliga Creek, Butler, April 22, 1946, P. W. Fattig, 1 ♂. Paratypes deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

Hydropsyche decalda new species (Pl. IV, fig. 18.)

This is a close relative of *depravata* Hagen, from which it differs in the hook-like lateral lobe of the tenth tergite, and the dorsal swelling at the tip of the aedeagus.

MALE.—Length 9 mm. Color of head and body light brown; legs and palpi yellowish lighter brown, nearly straw colored; antennae straw colored with prominent dark V-marks on segments 4 to 10; wings irrorate but without sharp contrast between the color shades comprising the pattern. General structure typical for genus. Eyes moderately large, separated on the dorsum by one and one-half times the dorsal width of one eye. Antennae slender, beyond the fifth segment slightly thinner than the tarsi. Genitalia as in fig. 18. Ninth segment short, with a very wide and evenly rounded lateral projection, and with the dorsum produced into a high sharp ridge beneath which

is a deep lateral cavity. Tenth tergite sloping steeply, cleft down the meson, each lateral portion consisting of a mesal cushion-like area bearing abundant stout setae, and an apico-lateral lobe which bears a small wart at its base and curves up to form a sharp dorsal point. Clasper slender, the basal segment slightly enlarged apically; the apical segment slender and sinuate, at apex curved ventrad and mesad. Aedeagus tubular, its base forming only about a 90° angle, the apical portion with a sclerotized tip which is produced slightly above the dorsal line of the remainder of the aedeagus, the end obliquely truncate.

Holotype.—Male; Beaver Creek, 5 miles southeast of Roberta, Georgia; September 6, 1945; (P. W. Fattig).

Hydropsyche rotosa new species (Pl. IV, fig. 17.)

The truncate and cylindrical aedeagus will serve to separate this species from *depravata* Hagen, its closest relative.

MALE.—Length 12 mm. Head and body very dark brown as are also the legs; antennae moderately dark brown with suffused V-marks on segments 3 to 10; wings irrorate, generally dark in tone. General structure typical for genus. Eyes small, separated on the dorsum by a distance equal to twice the dorsal length of an eye. Genitalia as in fig. 17. Ninth segment moderately short, the lateral lobe large and evenely rounded; dorsum produced into a sharp ridge below which are lateral concavities. Tenth tergite sloping only slightly, cleft down the meson; each half having a long cushion-like area armed with long stout setae, and a lateral lobe bearing a small wart and ending in a low round protuberance. Clasper elongate, the basal segment enlarged toward apex; apical segment straight and tapering from lateral view, its apex curved markedly mesad. Aedeagus tubular except for the extreme base which is flared and which forms about a 90° angle with the apical portion; this latter is almost straight and cylindrical, widened slightly beyond middle and tapered again beyond this; the apex is truncate from lateral view, incised a short distance from dorsal view, with neither dorsal nor ventral projections.

FEMALE.—Length 13 mm. Color and general structure similar to male. Genitalia practically identical with those of *betteni;* the clasper receptacle is a large and round invaginated pocket, and both the postero-lateral flange and the lateral lobe are produced and rounded.

Holotype.—Male; Tusculum College, Greene Co., Tennessee; August 8, 1946; (Mike Wright).

Allotype.—Female; same data as for holotype.

Paratypes.—Same data as for holotype, 4 ♀; same data but May 1–15, 1946, 1 ♂; same data but April 20–29, 1946, 1 ♂. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

Hydropsyche depravata Group

Previous to the recognition of the three new species described above, only three North America species were known for the *depravata* group. The doubling of this number of contained species has necessitated a re-evaluation of the characters to separate the various components. To aid in the separation, I have prepared a key which separates the *depravata* and the *cuanis* groups, and their North American representatives.

Key to Nearctic Species of the depravata and cuanis groups

1. Tenth tergite divided into a pair of simple lobes, each composed chiefly of a large, poorly defined setose wart, fig. 18A. *Cuanis* group.....**cuanis** Ross
   Tenth tergite divided into lobes, each having a mesal area bearing many stout setae, and a lateral area bearing a wart or projecting lobe, figs. 17–19. *Depravata* group.....2
2. Base of aedeagus curved into a half circle, fig. 19.....3
   Base of aedeagus curved to only a quarter circle, fig. 17.....4
3. Apical part of aedeagus straight; tenth tergite without sharp lobes. **betteni** Ross
   Apical part of aedeagus having a sharp angulation about one-third distance from end; tenth tergite with a sharp lateral lobe, fig. 19. **elissoma** new species
4. Ninth tergite very long, tenth short, less than a third length of ninth; aedeagus only slightly bent, the ventral angle about 140°, the extreme tip with a round dorsal enlargement.....**separata** Banks
   Ninth tergite short, tenth at least half length of ninth; aedeagus variously angled, fig. 17.....5
5. Tip of aedeagus having a ventral swelling; apical segment of clasper long.....**depravata** Hagen
   Tip of aedeagus having only a dorsal swelling or none; apical segment of claspers shorter, figs. 17, 18.....6
6. Aedeagus almost straight from basal angle to apex; lateral lobes of tenth tergite rounded, and not projecting posteriorly beyond mesal portion, fig. 17.....**rotosa** new species
   Aedeagus sinuate between basal angle and apex; lateral lobes of tenth tergite sharp at tip and projecting beyond mesal portion, fig. 18. **decalda** new species

Cheumatopsyche wrighti new species (Pl. IV, fig. 22.)

This species is a relative of *aphanta* Ross and *analis* Banks, differing from both in the very large apical lobes of the tenth tergite which occupy the entire posterior aspect of the tergite.

MALE.—Length 9 mm. Color very dark brown, almost black, the legs and palpi a slightly lighter shade of brown, the wings uniformly dark without any markings. General structure typical for genus. Genitalia as in fig. 22. Ninth segment short, with only a small lateral lobe, dorsally forming a very narrow raised area bearing a paired tuft of setae. Tenth tergite short and fairly deep, with a narrow semi-sclerotized strap at base and a sclerotized ventro-lateral area; lateral wart small and well defined, midway between the basal strap and the apical lobes. Apical lobes large, fig. 22A, obliquely set against the tergite and sloping backwards; the posterior surface of each is slightly sinuate, the large central expanse bearing a few short setae and the apical and slightly recurved edge bearing an irregular row of longer setae; the posterior aspect of each lobe is somewhat inverted shoe shaped, with a very broad mesal toe and a rounded lateral heel. Aedeagus typical for the genus, curved, and with a bulbous basal portion, enlarged about as much as in *analis* Banks.

Holotype.—Male; Camp Creek, Greene Co., Tennessee; May 28, 1946; (Mike Wright).

Cheumatopsyche zion new species (Pl. IV, fig. 21.)

This species is most closely related to *sordida* Hagen, from which it differs in the extremely small apical segment of the clasper and the larger lateral lobes of the tenth tergite.

MALE.—Length 7 mm. Color of head and body dark brown, appendages and venter light brown, approaching straw color, wings light brown with a faint irrorate pattern of lighter brown, especially marked on the anterior and apical portion of the wing. General structure typical for genus. Genitalia as in fig. 21. Ninth segment moderately wide, with a very large triangular lateral projection, and tapering dorsally to a high point with a pair of rows of long setae. Tenth tergite fairly long but shallow, the dorsal portion semi-sclerotized, the lateral portion bearing a small nodiform setose wart, the lateral lobes separated a considerable distance from each other and with the lateral aspect somewhat rectangular with an obliquely truncate apical margin, and a row of setae along the apical and ventral margin. Claspers elongate, fig. 21A, the basal segment enlarged and slightly bulbous at apex, the apical segment extremely small, scarcely visible from lateral view, from mesal view appearing as a short obliquely truncate lobe with a sharp mesal angle. Aedeagus curved and moderately swollen at base, typical for the genus.

Holotype.—Male; Zion National Park, Utah; June 28, 1945; (G. F. Knowlton).

PLECTROPSYCHE new genus

General structure typical for Hydropsychidae. Head with anterior warts indistinct, posterior warts large and ovoid. Eyes large, in both sexes occupying most of lateral aspect of head, malar space only about one-sixth as wide

as depth of eye. Maxillary palpus with second, third, and fourth segments subequal in length. Front wings narrower than hind wings and of different shape, fig. 20E, as in *Hydropsyche.* Front wing with cross-vein *cu* situated directly beneath fork of M and not more than its own length basad of *m-cu;* veins R_4 and R_5 separated widely from fork to apex; vein 1A with a linear tuft of stout setae about midway between fusion of 1A and 2A, and apex of 1A, the tuft occupying about one-sixth of this portion of the vein. Hind wing with R_2 present, but with *r* and *m* absent, *r-m* and *m-cu* present, the latter nearly right angled with Cu_1, joinging Cu_1 a short distance basad of its fork. Front tibia with two apical spurs, one twice as long as the other, the longer twice as long as the apical width of its tibia. In the female these spurs are slightly shorter than in the male. Mid tibia with preapical spurs only a third of the distance from the base. Female with mid tibia only slightly dilated. Female with sternal plates of eighth sternite separated for little more than a third of the segment, fig. 20C.

GENOTYPE: *Plectropsyche hoogstraali* new species.

This genus is most closely related to *Cheumatopsyche,* from which it differs in the possession of R_2 in the hind wing and in having Cu_2 and 1A joining to form a sharp angle in the front wing; and to *Potomyia* from which it differs in the venation of the hind wings, particularly the remote relation of M and Cu_1.

Plectropsyche hoogstraali new species (Pl. IV, fig. 20.)

To date this is the only species which is known in this genus.

MALE.—Length 7 mm. Color light brown, the venter, legs, and antennae yellowish brown; the wings also brown, without any marked pattern but with many of the veins slightly darker than the others. General structure as described under the genus. Genitalia as in fig. 20. Ninth segment produced into two widely separated dorsal lobes, each bearing three long setae, and with the lateral margin produced into a long truncate lobe. Tenth tergite, fig. 20A, composed of a central lobe incised on meson to form a pair of sharp short points, flanked on each side by a low lateral lobe and a setose wart. Clasper nearly straight, slightly narrowed beyond base and widened again near apex, bearing a cluster of long setae near apex; apical segment only indistinctly set off from basal segment, narrow, slightly sinuate, and pointed slightly less than one-half length of basal segment. Aedeagus with a large bulbous base which gradually constricts to a narrow neck beyond which the apical portion enlarges suddenly to form a pair of membranous lobes.

FEMALE.—Length 8 mm. Color and general structure as for male. Eighth sternite having shallow, rounded, apical lobes, fig. 20B and C. Ninth tergite, fig. 20D, with a well marked dorsal cap and with clasper receptacle large and situated nearly midway down the depth of the segment; the receptacle is formed by a dorsal flange which merges with a wide projection of the posterior margin.

Holotype.—Male; La Majada, Apatzingan, Michoacan, Mexico; August 12, 1941; (H. Hoogstraal); collected at 1200 feet in moist jungle.

Allotype.—Female; same data as for holotype.

Paratypes.—Same data as for holotype, 7 ♂, 3 ♀; same data but collected five miles west of Apatzingan, August 13, at light, 12 ♂, 1 ♀; Tancitaro-Apatzingan region, Michoacan, Mexico, summer 1941; (H. Hoogstraal); 1 ♂, 1 ♀. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

Hydropsyche Complex

During a search for characters to better define *Smicridea, Hydropsyche,* and other genera of Hydropsychidae, it was discovered that an excellent division of the family could be made on the basis of the wing attachment mechanism of the first anal vein in the front wing. In many genera, such as *Diplectrona* and *Smicridea,* this vein has minute hairs set irregularly along its entire length as do most other veins of the wing. In *Macronema* and its allies these hairs have been replaced by a very minute file-like roughening of the vein, and the wing membrane normally anterior to it has become invaginated to form a pocket. In *Hydropsyche,* and its allies, there has developed a linear patch of stout bristles along this vein, forming a patch which may vary from a quarter to an eighth of the length of 1A from its juncture with 2A to the tip of the wing. In the North American fauna only four described genera belong to this latter group, *Hydropsyche, Cheumatopsyche, Potomyia,* and *Plectropsyche.* These four genera may be separated by the following key.

1. Front wing with cross-vein *cu* at least twice its own length basad of *m-cu;* hind wing with Cu_{1a} at base running very close to M_{3+4}, *m-cu* frequently indistinct.....**Hydropsyche**
   Front wing with cross-vein *cu* not more than its own length basad of *m-cu,* occasionally joining Cu_1 beyond *m-cu;* hind wing with Cu_{1a} not running close to M_{3+4}, *m-cu* distinct, fig. 20E.....2
2. Hind wings with R_{2+3} undivided; front wings with Cu_2 and 1A joining near margin to form a blunt loop.....**Cheumatopsyche**
   Hind wing with R_2 present; front wings with Cu_2 and 1A joining before margin of wing to form a sharp angle, and with a distinct appendage beyond junction.....3

3. Hind wing with M running very close to Cu_1, Cu_{1a} branching near *m-cu* so that M_{3+4}, Cu_{1a}, and Cu_{1b} appear as a single 3-tined fork; and with 3A markedly divergent from 1A. Front tibia of male having no apical spurs. Malar space of female at least one-third of depth of eye. **Potomyia**

Hind wing having M and Cu_1 well separated and Cu_{1a} branching off considerably beyond *m-cu*, and not producing a 3-tined fork; and with 3A almost parallel with 1A, fig. 20E. Both sexes having apical spurs on front tibia and having a narrow malar space at most one-sixth depth of eye..... **Plectropsyche**

SMICRIDEA McLachlan

The study of a larger number of species in this complex indicates that the genus *Rhyacophylax* Müller 1879 should be considered as a synonym of *Smicridea*. The two genera have usually been considered distinct on the basis of the proximity of R_s and M to Cu_1 at their base. In the species which I have seen, the venation shows a definite gradation from *fasciatella* McLachlan, in which these veins are separated to an extreme degree, to species such as *signata* (Banks), in which these veins curve very close together. All of the species have in common certain characteristics which mark the entire group as a natural aggregation of species. Most prominent of these are: (1) in the front wing, the narrow angle of separation of the branches of R_s and especially R_{4+5}; (2) in the front wings the development of a strong arcuate serial vein composed of 3A, the end of 2A, and the long portion of 1A; and (3) in the hind wings the partial atrophy of the basal portions of R_s and M and the movement of the resulting weak veins toward Cu_1. To this genus belongs *Diplectrona unicolor* Banks.

Smicridea utico new species (Pl. V, fig. 24.)

This species is most closely related to *signata* (Banks), differing in the darker color of both body and wings and in the simple structure of the aedeagus. In the front wings the fork of R_{2+3} is almost directly above that of R_{4+5}, in which respect it resembles *fasciatella* McLachlan.

MALE.—Length 6 mm. Color various shades of dark brown, the wings gray brown with a mottling of darker marks scattered over the four wings; a diffused and very irregular brown mark extends along the veins of the cord. Eyes small, separated on dorsum by three times the dorsal width of

an eye. Genitalia simple in structure, fig. 24. Ninth segment with ventral portion narrow, anterior (internal) lobe of lateral region large and rounded, dorsum forming a high unmodified ridge. Tenth tergite divided down meson, most of its dorsal area membranous and bearing scattered setae, the apex of each lobe upturned and slightly truncate, merging basally with the ninth segment. Claspers elongate, the basal segment cylindrical but irregular, the apical segment narrow and finger-like, about two-fifths as long as the basal segment. Aedeagus with basal portion moderately large, apical portion straight and evenly and gradually widening toward apex; apex rounded, blunt, and irregular.

FEMALE.—Length 7 mm. Color and general structure similar to male. Female genitalia typical for genus, simple in structure, with the long diagonal ninth tergite without a prominent clasper receptacle.

Holotype.—Male; along Colorado River near Moab, Utah; June 26, 1943; swept from willows; (G. F. Knowlton).

Allotype.—Female; same data as for holotype.

Paratypes.—UTAH: same data as for holotype, 5 ♂, 1 ♀; same but June 27, 1 ♂. MEXICO: Chilpancingo, October 22, 1941, at light, D. M. DeLong, 1 ♂; Zitacuaro, at light, 1941, D. M. DeLong, 2 ♂, 2 ♀. Paratypes are deposited in the collections of the Academy of Natural Sciences of Philadelphia and the Illinois Natural History Survey.

This species was collected in Utah in company with *signata* (Banks). In *signata*, fig. 25, the aedeagus has several peculiar and constant finger-like processes at the apex, the lobes of the tenth tergite are produced into a sharp and upturned apex, and the internal angle of the ninth segment is sharp and upturned.

Smicridea caldwelli new species (Pl. V, fig. 23.)

The highly modified aedeagus distinguishes this species from *utico* and other dark winged *Smicridea* to which it is closely related.

MALE.—Length 5 mm. Color dark brown, the venter and legs slightly lighter, the wings uniformly brown. Eyes small, separated on the dorsum by three times the dorsal width of an eye. Venation similar to *utico*, having the fork of R_{2+3} very slightly beyond that of R_{4+5}; it resembles *fasciatella* in that *m-cu* is closer to the fork of M than to that of M_{3+4}. Genitalia as in fig. 23. Ninth segment broad, with a large and rounded internal lateral margin. Tenth tergite appearing as a projection of the ninth, each lateral edge reflexed and concave; the apex of each lobe of the tenth tergite ends in a short upturned point. Clasper with basal segment slightly sinuate, enlarged toward apex; apical segment narrow and finger-like, about one-third length of basal segment. Aedeagus complex, figs. 23A and B; basal portion

small and set at an angle to the apical portion; where they meet there is a high dorsal projection and beyond this a pair of lateral, upturned, pointed lobes; mesad of these is a pair of stout sclerotized rods which are pointed and curved laterad at tip; beneath the main body of the aedeagus is a mesoventral projection which is short, deep, and sinuately truncate at apex.

Holotype.—Male; Fortin, Vera Cruz, Mexico; October 9, 1941; (DeLong, Good, and Caldwell).

Family Hydroptilidae

Ochrotrichia trapoiza new species (Pl. V, fig. 26.)

In many respects this species is a primitive member of the genus, especially in respect to the short clasper. Processes of the tenth tergite, however, are fairly well developed and indicate that the species is related to *weddleae* Ross on the one hand and to the *spinosa* group on the other. From the former it may be distinguished by the more highly developed processes of the tenth tergite and from the latter by the short and trapezoidal clasper.

Male.—Length 3 mm. Color very dark brown, almost black, the legs and parts of the venter pale brown to straw color. Antennae long and slender, almost reaching the apex of the ends of the wings. Tibial spurs long, stout, and hairy. Genitalia as in fig. 26. Ninth segment moderately long and deep, the dorsum produced anteriorly into an internal sclerotized bridge, and cut away posteriorly to accommodate the tenth tergite. Tenth tergite divided into three definite processes: uppermost of these is a slender sinuate process; below this a curved sclerotized process which is recurved and flattened apically; below these two is a shorter large membranous lobe. Clasper short and deep, somewhat trapezoidal in outline, with a gently rounded apical corner and an obliquely truncate apical margin; mesal face with a diagonal row of stout black spines above the ventral margin, with scattered long spines over most of the clasper, and with a cluster of short peg-like spines around the apical portion.

Female.—Length, color, and general structure similar to male except that the antennae are only about one-half the length of those in the male. Genitalia simple in structure, with a triangular tenth tergite, with apical margin of the eighth sternite indefinite.

Holotype.—Male; Buena Vista, Colorado, sweeping marsh at Yale Lake; August 5, 1943; (J. A. and H. H. Ross).

Allotype.—Female; same data as for holotype.

Paratypes.—Colorado: same data as for holotype, 25 ♂, 2 ♀. Utah: Garfield, May 25, 1945, G. F. Knowlton, 21 ♂, 5 ♀. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

Ochrotrichia phenosa new species (Pl. V, fig. 27.)

This species is most closely related to *spinosa,* but differs markedly in the more sharply angled clasper and the right dorsal process of the tenth tergite which is elongate and has a stout spur at its apex. The only other species of *Ochrotrichia* in which this process has spurs are those of the *confusa* group, in which the clasper and other parts are quite different.

MALE.—Length 2.5 mm. Color dark brown with the legs and venter paler. Antennae as long as the body. Genitalia as in fig. 27. Ninth segment triangulоid, the lateral portion with a fairly sharp internal angle, the dorsum produced into a fairly long shallow internal bridge, and the apical portion of the dorsum incised. The tenth tergite with a short basal piece to which is attached the long principal sclerotized process which is curved ventrad at apex. To the right of this process is a long finger-like one bearing a stout peg-like spur just before its apex, and below this are two sharp flat processes, the upper one about twice as long as the lower. Clasper markedly sinuate, the basal portion bearing a postero-ventral projection, the upper apical portion fairly long and slightly constricted in the middle to give it a spatulate appearance; near the center of the clasper is a mesal shoulder bearing two stout spines. The two claspers are nearly identical.

Holotype.—Male; Deschutes River, Redmond, Oregon; July 28, 1939; (J. Schuh).

Hydroptila quinola new species (Pl. V, fig. 30.)

This species is extremely well set off from any North American forms. It approaches most closely *angusta* Ross and its allies but differs from them in the unornamented aedeagus, long pointed ventral plate, and shape of the claspers.

MALE.—Length 2.5 mm. Color gray brown, the legs and venter paler. General structure typical for genus. Genitalia as in fig. 30. Tenth tergite divided into a large round mesal lobe and a pair of slightly divergent lateral lobes each tapering to a long thin point. Claspers well separated on meson, each having the main portion long, slender, and blade-like, the tip pointed, the clasper without sclerotized points but having at its base a thumb-like projection which bears a single and very long macrochaeta. Ventral plate (situated immediately dorsad of the claspers) nearly as long as the claspers, triangular and sharp at the apex where are situated a pair of short divergent setae. Aedeagus elongate, fig. 30A, the basal portion ending in a small swollen cup, the apical portion slender, and tapering evenly to apex, the aedeagus without spiral processes or spurs.

Holotype.—Male; Costello Lake, Station 4, Algonquin Park, Ontario; June 12, 1939; (W. M. Sprules).

Paratype.—Same data as for holotype but August 26, 1938, ♂ [ANSP].

Hydroptila latosa new species (Pl. V, fig. 29.)

This species is most closely related to *quinola,* described above, differing from it in the elongate lateral process of the clasper and the round ventral plate.

MALE.—Length 2.5 mm. Color gray brown, the venter and legs paler. General structure typical for genus. Genitalia as in fig. 29. Tenth tergite divided into three lobes, a mesal membranous truncate lobe and a pair of sharp lateral semi-sclerotized lobes. Ventral plate long and broad, evenly rounded at apex, with a pair of short spines near apex. Claspers well separated at base and elongate, converging at apex; each clasper with the body slender and elongate, with scattered short setae but without sclerotized points; near the base arises an angled finger-like process from the apex of which arises a long curved spine. Aedeagus elongate and slender, fig. 29A, the basal portion sinuate, tapering to a long narrow neck with a small bulb at its apex; apical portion narrow and curved; aedeagus without spurs or spiral process.

Holotype.—Male; Tharpes' Pond, Perry, Georgia; March 17, 1945; (P. W. Fattig).

Hydroptila tusculum new species (Pl. V, fig. 28.)

In many respects this species most closely resembles *scolops* Ross but differs markedly from this and all other members of the genus in the long and peculiar tenth tergite.

MALE.—Length 3 mm. Color gray brown, with the under parts and appendages lighter. General structure typical for genus. Genitalia as in fig. 28. Ninth segment almost completely retracted within the eighth, but the eighth without spines or conspicuous processes. Tenth tergite extremely long, most of it sclerotized but not darkened, at apex divided into a truncate mesal lobe and a pair of deep lateral lobes, each produced at apex into a slender, heavily sclerotized, finger-like process. Claspers elongate, with a broad base and a slender apical blade, each clasper sharply angled so that from lateral view the base and blade form an almost perfect right angle with each other. The ventral aspect of the blade is wide near the base and tapers to a slender point, the lateral aspect is almost parallel sided to near apex; the clasper has a scattering of fine setae but no sclerotized points. Ventral plate moderately long and narrowed to a pointed apex which bears a pair of stout setae. Aedeagus elongate and straight, fig. 28C, the apical portion wide at base, beyond which it is slender and tapers evenly to apex. Spiral process slender, making slightly more than one complete circle around the stem.

FEMALE.—Size, color, and general structure similar to male. Eighth segment of very peculiar structure, fig. 28B. Apex of sternite broad and evenly arcuate, armed with four scattered setae, apex of tergite slightly narrowed and incised on meson; internally the base of the segment is produced into a convoluted ventral arc, from each side of which originates a heavily sclerotized tendon which proceeds laterad. Spermatheca with basal portion moderately broad.

Holotype.—Male; Tusculum College, Greene Co., Tennessee; August 8, 1946; (Mike Wright).

Allotype.—Female; same data as for holotype.

Paratype.—Same data as for holotype, 1 ♀ [ANSP].

Family PHRYGANEIDAE

Ptilostomis semifasciatus (Say)

MAINE: Greenville, July 29, 1919, F. Haimbach, 2 ♀ [ANSP].

Ptilostomis ocellifera (Walker)

MAINE: Greenville, July 29, 1919, F. Haimbach, 1 ♂ [ANSP]. NEW JERSEY: Lakehurst, July 13, 1940, J. W. Cadbury, 2 ♀ [ANSP]. PENNSYLVANIA: Philadelphia, May 27, 1912, 1 ♂. Union Co., Buffalo Flat, between Buffalo and Branch Mountain, June 20–July 1, 1938, Rehn, Pate, and Rehn, 1 ♀ [ANSP]. VIRGINIA: Hot Springs, at light, July 8, 1916, M. Hebard, 1 ♀ [ANSP].

Banksiola selina Betten

MAINE: Greenville, July 21–29, 1919, F. Haimbach, 4 ♀ [ANSP].

Family LIMNEPHILIDAE

Dicosmoecus canax new species (Pl. VI, fig. 32.)

In form of genitalia this species differs markedly from other members of the genus, especially in regard to the smooth curved rods which probably represent the tenth tergite. The indistinctly segmented claspers and the shape of the aedeagus, however, indicate that the species belongs in *Dicosmoecus*.

MALE.—Length 17 mm. Color light brown, the eyes and leg spines black, the wings uniformly pale brown. Dorsum of head with a mat of silky hairs, but with no prominent macrochaeta. Maxillary palpus of usual length, the two apical segments subequal and each equal to the length of the second segment of the front tarsus. Venation typical for *Dicosmoecus*, fig. 32, including the broad wings and zigzag course of the cord; surface of wings granulate. Tibial spur count 1–2–4; front and middle femur each having a

single black spine at apex; middle tibia with black spines scattered over almost its entire length, hind tibia with only about a dozen spines, these on the apical two-thirds of the segment; tarsus with basal four segments many spined, apical segment without any black spines; two black spines between apical spurs of tibiae of middle and hind legs. Genitalia as in fig. 32A. Ninth segment fairly broad ventrally, narrowing apically, the part that appears to be its apical margin forming a short hood. Cercus twice as long as wide, rounded at apex and bearing many long setae. Arising from the mesal margin above the claspers is a pair of closely appressed, heavily sclerotized, black curved rods which form almost a semi-circle; these may represent the lobes of the tenth tergite. Claspers elongate, the two divergent at base and slightly recurved again at apex; each clasper has a basal shoulder and beyond this a narrowed portion which is notched to form an indistinct apical segment. Aedeagus relatively small, an invagination forming an elongate membranous tube containing an elongate rod-like structure bearing two rows of lateral black spines typical of many *Dicosmoecus* species.

Holotype.—Male; Logan Canyon, Utah; Sepember 21, 1939, at light; (G. F. Knowlton).

Paratype.—Same data as for holotype, 1 ♂ [ANSP].

PEDOMOECUS new genus

This genus appears to be most closely related to *Dicosmoecus* in having segmented claspers, but the shape of the aedeagus is suggestive of *Hesperophylax* and its allies. It differs from *Dicosmoecus* in the very short discal cell (first R_3); and from other genera in the distal branching of R_{2+3} in the hind wing.

Adult.—General characteristics typical of the family Limnephilidae. Ocelli prominent. Dorsum of head with abundant silky hair but without prominent macrochaetae. Maxillary palpus short. Warts on lobes of scutum small and oval, connected posteriorly by a suture-like line. Legs with tibial spur count of 1–2–2; apex of front and middle femora having only one black spine; middle tibia with black spines scattered over its entire length. Hind tibia with black spines on only the apical half; two black spines between the apical spurs of the middle and hind tibiae. Tarsus with very few spines, none on the apical segment, usually none but occasionally one on the fourth segment and from none to four on the third segment. Venation as in fig. 31. Front wing with R_1 straight, discal cell short and the apical radial cells very long, M_{1+2} branching just beyond *r-m*. Hind wing with R_2 arising midway between *r* and edge of wing; anal lobe small, expanded into a fan which is confluent with the margin of the rest of the wing. Eighth tergite of abdomen without cushions of black setae or other specialized structures.

GENOTYPE: *Pedomoecus sierra* Ross.

Pedomoecus sierra new species (Pl. VI, fig. 31.)

To date this is the only species known in the genus. From species of related genera it is readily identified by the structure of the male genitalia.

MALE.—Length 8 mm. Color light yellowish brown, almost straw color with the exception of the eyes and tibial spurs which are black; wings immaculate, almost straw color. General structure as described for genus. Genitalia as in fig. 31A to C. Ninth tergite very narrow, reduced to a ring ventrally, wider dorsally. Tenth tergite apparently represented by a hood-like projection confluent with ninth tergite, this projection divided into a pair of shallow apical lobes. Clasper large and occupying most of lateral aspect, its base large and trianguloid, the apex divided into a finger-like curved dorsal projection, a membranous posterior shoulder and a large mesal lobe; this lobe proceeds mesad from the clasper and then abruptly angles posterad, and ends in a sharp peg-like tooth. Aedeagus short, fig. 31C, consisting of a semi-membranous tubular ventral lobe and a larger dorsal lobe; dorsal lobe consists of a central narrow curved process on each side of which arises a sclerotized structure which is divided into three large spines, the two lateral spines having an extra small tooth at their base.

Holotype.—Male; Convict Creek, Mono County; September 19, 1937; (H. J. Rayner).

Paratypes.—CALIFORNIA: South Fork, King's River, above Cedar Grove, King's Canyon National Park, September 24, 1941; (James W. Moffett), 1 ♂ [ANSP].

Hesperophylax occidentalis (Banks)

BRITISH COLUMBIA: Gold River, Aug. 19–20, 1908, 2 ♂ [ANSP]. NEW MEXICO: Fort Wingate, Aug. 19, 1908, John Woodgate, 2 ♀; same data but Sept. 24, 1 ♂ [ANSP, INHS].

Hesperophylax incisus Banks

COLORADO: 1 ♀ [ANSP]. OREGON: Strawberry Creek, Strawberry Mountains, 4,450 feet, August 20, 1928, Rehn and Hebard, 1 ♀ [ANSP]. UTAH: Silver Lake, July, 1914, H. Skinner, 1 ♀ [ANSP]. BRITISH COLUMBIA: between Nelson and Finley Div., Akie Pass (W. Nelson Source), Upper Peace River district, July 22, 1933; J. deN. Henry, 5 ♂, 1 ♀ [ANSP, INHS].

Hesperophylax magnus Banks

ARIZONA: Reef, Cochise County, November, 1916, Biederman, 1 ♀ [ANSP]. NEW MEXICO: Jemez Mts., 6,400′ elev., Oct. 16, 1917, J. Woodgate, (Haimbach Collection), 1 ♂ [ANSP].

Hesperophylax consimilis (Banks)

NEVADA: Quinn Cañon Range, Ox Spring, Aug. 27, 1924, Rehn and Hebard, 1 ♂ [ANSP].

Limnephilus curtus Hagen

LABRADOR: Bonne Esperance, Oct. 1, 1912, H. G. Bryant, 2 ♂ [ANSP, INHS].

Limnephilus fagus Ross

IDAHO: Upper Salmon River, Smiley Creek, 7,200 feet, Aug. 16, 1928, Rehn and Hebard, 1 ♂ [ANSP].

Limnephilus nogus Ross

W(ASHINGTON) T(ERRITORY): 3 ♀ [ANSP].

Oligophlebodes minutus (Banks)

NEW MEXICO: Beulah, June 29, 1902, 1 ♂ [ANSP].

Neophylax atlanta new species (Pl. VI, fig. 34.)

This species is most closely related to *mitchelli* Carpenter, but differs in the broad, laterally concave clasper.

MALE.—Length 10 mm. Body light brown, the antennae and legs yellow. Wings chiefly medium brown with a faint irrorate pattern, but with two large patches of yellow-orange along the anal margin; when the wings are folded, these patches make a double diamond golden mark against the brown ground color of the body and wings. Sixth sternite with a small mesal process, seventh tergite with a fairly long one. Genitalia as in fig. 34. Ninth sternite robust, produced on meson into a low broad projection; above the sternite is a broad triangular setose process. Dorsally the ninth and tenth tergites are confluent. The tenth is divided into a long, fairly slender, dorsal process and a long, down-curved, ventral process. Clasper with a narrow base, widening into a broad, laterally concave plate which is produced ventrad into a long spurlike tip.

Holotype.—Male; Atlanta, Georgia; November 6, 1945; (P. W. Fattig).

Paratypes.—GEORGIA: Atlanta, (P. W. Fattig), November 2, 1944, 1 ♂; November 5–10, 1945, 5 ♂; October 31, 1946, West Candler's Lake, 1 ♂; Spalding Co., November 7, 1938, T. L. Bissel, 1 ♂. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

Neophylax aniqua new species (Pl. VI, fig. 33.)

This species is most closely related to *autumnus* Vorhies, but differs in the short claspers.

MALE.—Length 10 mm. Color light orange yellow except for the eyes and leg spines which are dark brown, and the wings. These are mostly light tawny yellow with an irrorate light design becoming darker brown toward the apex of the wing; the anal area of the front wing has a cream-colored band posterior to Cu_2 and extending the length of this vein; when the wings are folded this makes a broad cream stripe down the center of the body. General structure typical for genus. Seventh segment with a sclerotized mesal process. Genitalia as in fig. 33. Ninth sternite broad, its apico-ventral margin only very slightly produced, sinuate. Tenth tergite divided at apex into two short lobes, the dorsal one round and deeper than the ventral one. Clasper with a broad humped base, and with the apical portion curved mesad and ventrad; from lateral view the clasper projects very little beyond the ninth sternite.

Holotype.—Male; Val d'Espoir, Quebec; October 3, 1939; (J. Ouellet).

Family LEPTOCERIDAE

Oecetis daytona new species (Pl. VI, fig. 36.)

This species most closely approaches *immobilis* Hagen but differs from it radically in the shape of aedeagus and clasper.

MALE.—Length 5.5 mm. Color light brown throughout, the wings with a few darker markings especially at the forks of veins. General structure typical for genus. Sixth to eighth tergites without specialized areas of fenestration or reticulation. Genitalia as in fig. 36. Ninth segment almost perfectly annulate, forming a narrow ring. Cercus only twice as long as wide, with a scattering of long setae. Tenth tergite with a finger-like dorsal process and a submembranous ventral process beneath it. Clasper fairly narrow, in lateral view tapering from base to apex, the ventral margin slightly sinuate, the apex pointed; from ventral view, fig. 36B, the claspers appear broader at base, with a dark mesal hook about two-thirds distance to apex, and beyond the hook narrowed abruptly to a sharp point; the two claspers are remote at base. Aedeagus short and only slightly curved, fig. 36A, the sclerotized portion consisting of a narrow base which widens into a truncate apex with straight dorsal margin and bowed ventral margin; from the apex extrude several membranous folds which apparently lack any heavily sclerotized structure.

FEMALE.—Similar to male in size and general structure. Genitalia very simple in structure, differing from those of *immobilis* chiefly in lacking the diamond-shaped sclerotized mark on the eighth sternite. This is represented by a crescentic dark band separated from the ninth segment by a crescentic wide area.

Holotype.—Male; Daytona Beach, Florida; July 27, 1945, light trap; (G. T. Riegel).

Allotype.—Female; same data as for holotype.

Paratypes.—Same data as for holotype, 2 ♂, 2 ♀; same data but August 27, 1945, 7 ♂, 12 ♀; same data but July 31, 1945, 1 ♂. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

Oecetis porteri new species (Pl. VI, fig. 35.)

This species is a close relative of *Oecetis inconspicua* (Walker) from which it differs in its uniformly dark color, in the longer and cylindrical aedeagus, and the much more sharply sinuate clasper.

MALE.—Length 5.5 mm. Color uniformly a very dark gray brown, the legs only slightly lighter; the wings lack any trace of maculation. General structure typical for genus. Sixth, seventh, and eighth tergites without any specialized fenestrate or reticulate areas. Genitalia as in fig. 35. Ninth segment relatively narrow but with a broad lateral apical angulation, the dorsal portion almost as wide as the ventral portion. Cercus large and almost triangular, the upper and lower margins rounding slightly to a blunt point. Tenth tergite forming a submembranous lobe between the cerci. Clasper in lateral view with a marked dorsal shoulder near middle, below which the apex angles suddenly ventrad then posterad to a narrow tapering point. Aedeagus one and one-half times as long as deep, the sclerotized portion forming a stout ventral hook-like process and, posterior to this, the membranous apical portion forms a second somewhat similar process; internally the aedeagus contains a long spiral rod.

FEMALE.—Similar in structure to that of *inconspicua* but differing from it in color of wings. The forewings are uniformly dark brown without any trace of the darker mark across the cord which is characteristic of *inconspicua*.

Holotype.—Male; Miami, Florida; November 20, 1945; (J. Porter).

Allotype.—Female; same data as for holotype except November 14, 1945.

Paratypes.—FLORIDA: Miami, November 14, 1945, 35 ♂, 6 ♀; November 18, 1945, 2 ♀; November 15, 1945, 1 ♂; all collected by J. Porter. Daytona Beach, July 26, 2 ♂, 3 ♀; July 27, 1 ♀, collected by G. T. Riegel. New Smyrna, in light trap, July 21–23, 1943, 1 ♂, 4 ♀; July 23-August 5, 1943, 1 ♂. Paratypes are deposited in the collections of the Illinois Natural History Survey, the

U. S. National Museum and the Academy of Natural Sciences of Philadelphia.

Triaenodes melaca new species (Pl. VI, fig. 35A; Pl. VII, fig. 37.)

This species is most closely related to *aba* Milne but differs from it and other species of the genus in characters of the male genitalia, especially the extremely long filamentous processes and aedeagus, and very long ninth sternite.

MALE.—Length 11 mm. Color in general cream with narrow dark rings at each joint of the antennae, and darker markings on the wing. Forewings colored as in the *ignita* group, with the central part of the wing brown; linear apical band, linear anal band, and an irregular apical triangle cream. First antennal segment with a mesal scale pocket. General structure typical for the genus. Genitalia as in fig. 37. Ninth segment very long ventrally, produced anteriorly into a long baso-lateral lobe; dorsad the ninth segment is relatively narrow, as in related members of the genus. Cerci finger like and narrow, little more than one-half the length of the tenth tergite, each finger like, simple and pointed. Clasper short, fig. 35A, with a broad base and a narrow apical portion which is somewhat blade like, appearing thin and pointed from ventral view and round from lateral view, its mesal surface bearing a cushion of stout spines. Aedeagus long, slender, and evenly arcuate, arising deep within the ninth segment, its apical portion cleft to form a sharp dorsal process and a larger submembranous ventral lobe. From within the base of the ninth segment, and attached to the claspers by a large tendon, there arises the pair of filamentous processes which curve back within the body and then back over the aedeagus, which they parallel at its tip; the left lateral process is branched near the middle, both branches paralleling the aedeagus and both extremely slender and threadlike.

FEMALE.—Length 9–10 mm. Color and general structure similar to male. Female genitalia typical of the *ignita* group, in respect to the external plates and processes. Spermatheca composed of a sclerotized hook enclosed in a membranous shroud, which tapers to a long thin terminal filament extending some distance anteriorly into the body; the sclerotized hook is narrow and spatulate from ventral view and the ventral edges of the membranous "shroud" appear as convoluted margins on each side of the sclerotized portion.

Holotype.—Male; Blackman's Creek, Rudement, Illinois; May 14, 1946; (Mohr & Burks).

Allotype.—Female; Bell Smith Springs, near Eddyville, Illinois; June 6, 1946; (Mohr & Burks).

Paratypes.—ILLINOIS: same data as for allotype, 1 ♂. Lusk Creek, Eddyville, June 7, 1946, Mohr & Burks, 1 ♀. Herod, May 29, 1935, Ross & Mohr, 1 ♀. Paratypes are deposited in the collec-

tions of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

This species which was recorded by Ross[1] as *Triaenodes species a,* was based on the last mentioned female paratype, listed above. It is fairly certain also that *Triaenodes species b* (recorded in the same paper), based on larvae from Herod, Illinois, is the same species. Additional larvae were collected in small numbers at Rudement, Illinois, at exactly the same spot where the holotype was collected. Collections made in 1946 indicate that this species may be the only member of the genus occurring in the small rapid southern Illinois Ozarkian streams, and that this caddis fly occurs scattered throughout the region. There is still a possibility, however, that the larvae recorded as *species b* might be *perna* or even some other species since the present observations are based entirely on circumstantial evidence and not on rearing.

Family Goeridae

Goera archaon new species (Pl. VII, fig. 39.)

This species is distinguished from its North American congeners by the unique shape of the claspers and the short, membranous and simple aedeagus.

Male.—Length 8 mm. Color of body, coxae, and femora medium shades of brown, the tibiae and tarsi lighter, especially the middle and hind pair which shade to yellowish or straw color. Maxillary palpi apparently one-segmented, short and club shaped, and held in front of the face. Genitalia as in fig. 39. Ninth segment extremely narrow laterally and ventrally, wider near the dorsum; the ventral margin forms a wide low arcuate tongue which extends slightly over the base of the claspers. Tenth tergite, fig. 39A, apparently consisting of three pairs of processes, (1) a short finger-like pair at the base, (2) an elongate pair forming submembranous rods, and (3) a lateral pair held in a horizontal plane and paralleling the elongate rods. The cerci arise one on each side of these, each cercus about as long as wide and bearing scattered setae. Claspers touching at extreme base but diverging so that for most of their length they are separated by a considerable distance on the meson. Each clasper is two-segmented, fig. 39B, the basal segment high but short, the apical segment composed of a dorso-lateral swollen portion covered with long setae, and a mesal sclerotized tongue, the two parts connected for almost their entire length by a concave submembranous area. Aedeagus fairly short, the base moderately large, tapering to a narrow central portion; from there the aedeagus enlarges slightly toward the apex which comprises a series of membranous folds.

[1] Bull. Ill. Nat. Hist. Survey xxiii (1) : 253.

Holotype.—Male; Fall Creek, near Corvallis, Oregon; May 1, 1941; (C. Whitmore).

Paratypes.—OREGON: East River, May 26, 193–; (George Harry); 1 ♂. Rock River, near Corvallis, May 1, 1941, C. Whitmore, 2 ♂. Paratypes are deposited in the collections of the Illinois Natural History Survey, Oregon Agricultural College and the Academy of Natural Sciences of Philadelphia.

This species seems to be one of the most generalized yet described in the genus, approaching in the simplicity of its structures some of the European species of *Silo* and *Lithax,* but it has the expanded cell Cu_{1b} in the forewing, typical of *Goera.* Of the North American species it is most closely related to *calcarata* Banks. A key is given below for the separation of the males of the Nearctic species.

Key to Males of Nearctic Species

1. Tenth tergite composed of two pairs of elongate processes or rods, fig. 39A.....2
   Tenth tergite composed of a mesal process flanked on each side by a long, sclerotized rod (r) extending far beyond the mesal process, fig. 38.....3
2. Clasper having a digitate, sclerotized mesal process, separated from clasper body except at base, fig. 40; all four processes of tenth tergite slender, heavily sclerotized and needle like....**calcarata** Banks
   Clasper having a sclerotized mesal region, but this connected to the more membranous lateral region except at apex, fig. 39B; tenth tergite having median processes slender and round, lateral processes flat but wide, fig. 39A.....**archaon** new species
3. Mesal process of clasper bearing a large tooth within basal curved portion, fig. 38; lateral process elongate and digitate..**fuscula** Banks
   Mesal process of clasper having a ventral flanged edge, and having a saw edge within curve of basal portion; lateral process pointed, but definitely triangular in outline.....**stylata** Ross

Family BRACHYCENTRIDAE

In 1941 [2] I recorded a series of *Micrasema scissum* McLachlan from Point Barrow, Alaska. A more detailed study of these specimens and their relationship to other North American species has brought out some very interesting suggestions as to their groupings and affinities.

[2] Trans. Amer. Ent. Soc. LXVII: 115

Based chiefly on the formation of the anal veins of the front wing, there appear to be three major phylogenetic branches of Brachycentridae represented in the Nearctic fauna. The first has the anal venation complete, with all the cells large and the veins well marked. From this generalized condition there are two lines of divergence. In the first, 3A has become subordinate and close to 2A, resulting in a narrow, lanceolate anal cell with a small posterior appendage, which is cell 2A, fig. 48. In some species all traces of vein 3A are apparently lost and the anal cell is slender and tapering at the base. In the other divergent line, vein 3A has remained strong and 2A has become weakened and atrophied by successive steps, figs. 46, 47. In this group the broad outline of the anal cell has a marked angulation at the postero-mesal corner.

The group having generalized anal cells takes the name *Brachycentrus* Curtis, and is further characterized by having R_{4+5} branching at *r* and *r-m*. Two species previously described in the genus, *aspilus* Ross and *dimicki* Milne, must be transferred to other genera.

The group in which cell 2A shrinks and vein 3A atrophies belongs to *Oligoplectrum* McLachlan. Two North American species belong here, *dimicki* (Milne) and a new species described below; in both of these 3A is represented by a weak vein situated very close to vein 2A. The genotype, *O. maculatum* (Geoffrey), lacks 3A completely.

The group in which 2A is reduced but 3A is strong comprises the genus *Micrasema* McLachlan, which exhibits several conditions of anal cells. In *scissum* McLachlan and *sprulesi* Ross all of the anal veins are present, but the apical abscissa of 2A is very weak, fig. 47; in *aspilus* and the *rusticum* group, 2A and *a* form a loop-like serial vein, fig. 46; and in the *bactro* group 2A and *a* are completely absent.

Key to Nearctic Genera

1. Front wings having R_4 and R_5 sessile, branched at *r* and *r-m*. **Brachycentrus**

   Front wings having R_{4+5} stalked, branching beyond *r-m*, figs. 46–48..2

2. Front wings having cell 2A small or subatrophied, vein 2A strong, fig. 48..... **Oligoplectrum**

   Front wings having cell 2A large or part or all of vein 2A atrophied, figs. 46, 47..... **Micrasema**

Micrasema scotti new species (Pl. VII, fig. 41.)

This species is most closely related to *wataga,* differing from it in the broad, sharp, shelf-like overhang of the lateral aspect of the claspers, and the truncate produced end of the claspers.

MALE.—Length 7 mm. Color very dark brown; legs below coxae slightly lighter; wings uniformly dark brown, without markings and concolorous with head and body. Maxillary palpi 3-segmented, the first segment very short, the apical two forming a curved sausage-shaped structure which curves in front of and considerably above the head. Anal veins of front wing with 2A and *a* present as a loop, apical abscissa of 2A atrophied. Tergites 1–8 unmodified and similar, the eighth shorter than the others but otherwise the same. Genitalia as in fig. 41. Ninth segment broad laterally, narrow above and below. Cerci divergent on the meson, touching only at one point at the base. Each cercus deeply incised to form a triangular and pointed mesal lobe, fig. 41A, and a round lateral lobe; the two lobes are separated also by a concavity, so that in lateral view the small lateral lobe appears to be detached; the mesal lobe has a broad ventral ridge. Tenth tergite divided into a pair of stout sclerotized lobes, each bearing a group of sharp setae at apex. At the base of the tenth tergite arises a pair of long semi-membranous processes bearing stout setae at their apices. Clasper fairly slender and sharply angled at apex, the lateral aspect having a sinuate overhanging ridge, the top of the angulation having a pair of long stout setae, and the tip of the anal portion wide, truncate, and armed with three or four small teeth. Aedeagus tubular and simple, typical for genus.

FEMALE.—Length 7.5 mm. Color and general structure similar to male and typical for genus. Eighth sternite large and quadrate, with apicolateral angles nearly square, the meson with a low wide point. Ninth and tenth tergites forming a triangle without conspicuous processes or other modifications.

Holotype.—Male; Speed Hollow, Springville, Indiana; April 26, 1946; (Ricker et al.).

Allotype.—Female; same data as for holotype.

Paratypes.—Same data as for holotype, 4 ♂. Paratypes deposited in the collection of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

This species is named in appreciation of the help given us by Mr. Donald C. Scott, who, with Dr. W. E. Ricker, Indiana University, guided us to many interesting collecting localities in southern Indiana. The stream along which we took *scotti* is a small rocky one emerging from a cave and traversing a thickly wooded ravine in the limestone country between Bedford and Bloomington, Indiana.

Micrasema bennetti new species (Pl. VII, fig. 42.)

This species is a close relative of *charonis* Banks, differing in the broad, hatchet-shaped end of the clasper, which in *charonis* is very narrow; *bennetti* also has a cluster of five or six smaller setae on the top of the angulation of the clasper, instead of the two large ones typical of *charonis*.

MALE.—Length 5 mm. Color various shades of brown, the head and thorax dark brown, the antennae, mouthparts and legs pale brown, the wings medium brown, the veins slightly darker, but without definite maculations. General structure typical for group. Abdominal tergites of uniform structure throughout. Genitalia as in fig. 42. Ninth tergite very wide laterally. Cerci diverging, almost touching on the meson at the base. Each cercus somewhat triangular and short, fig. 42A, the lateral margin sinuate and the apex tapering to a rounded point; ventral surface concave, without prominent ridges. Lobes of tenth tergite heavily sclerotized, with a cluster of spines at tip. At the base of tenth tergite there is a pair of short lobes, each bearing two or three small setae at its tip. Clasper sharply angled at apex, the apical portion and the angled part broad and massive, nearly as wide as the base; the top of the angulation bears about five moderately long setae and the margin of the apex bears four teeth which are conspicuous from posterior view and just barely visible from lateral view. Aedeagus curved and tubular, typical for genus.

FEMALE.—Length 5.5 mm. Color and general structure typical for male. Genitalia similar to preceding species except that the sides of the eighth sternite are slightly more converging at apex.

Holotype.—Male; Cacapon River, Capon Bridge, West Virginia; May 1, 1944; (Frison and Ross).

Allotype.—Female; same data as for holotype.

Paratypes.—Same data as for holotype, 50 ♂, 1 ♀. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

I take pleasure in naming this species after Dr. George W. Bennett of the Aquatic Biology Section, Natural History Survey, who accompanied the late Dr. T. H. Frison and myself and assisted in the collecting on the trip during which this species was taken.

Micrasema onisca new species (Pl. VII, fig. 44; Pl. VIII, fig. 54.)

This species is most closely related to *arizonicum* Ling but differs from that species in having two lobate processes instead of one projecting above the dorsal outline of the clasper.

MALE.—Length 6 mm. Color dark brown, nearly black, legs below coxae lighter brown; wings moderately dark brown with the veins darker, the forewings clothed with thick brown hair so that they appear concolorous with the body. Maxillary palpi 3-segmented, long, curving in front of and above the head. Abdominal tergites all of similar shape and structure, fig. 54, only slightly or not at all incised on the meson, having a sclerotized thickening only along the extreme lateral margins of the sclerotized portion, and bearing an irregular row or cushion of setae which occupies most of the apical margin. Genitalia as in fig. 44. Ninth segment only moderately long, tapering to a blunt ventral portion, the dorsal portion forming a narrow sclerotized strap. Cerci diverging, touching only at extreme base. Each cercus fairly long and narrow, pointed at tip. Clasper with the main body nearly parallel sided, slightly constricted near base, evenly rounded at apex; on its mesal side are a pair of dorsal submembranous lobes, fig. 44A, the basal one evenly rounded, the apical one curved mesad and hooked at its tip. Lobes of tenth tergite short and relatively massive at apex, at the base merging with a pair of indistinct membranous elevations.

FEMALE.—Length 6.5 mm. Color and general structure similar to male. Eighth sternite and ninth and tenth tergites similar to other species in the genus, the eighth sternite with the apico-lateral angles relatively sharp and the mesal projection wider and lower than in *scotti*.

Holotype.—Male; Hastings Natural History Reservation, Monterey County, California; June 13, 1945; (Jean M. Linsdale).

Allotype.—Female; along river south of Hatch, Utah; June 28, 1945; (G. F. Knowlton).

Paratypes.—CALIFORNIA: same data as for holotype, 1 ♂; same data but June 16, 3 ♂; same data but June 25, 1 ♂; same locality but May 24, 1938, at light, C. D. Michener, 16 ♂. UTAH: Long Valley, south of Hatch, June 28, 1945, 35 ♂, 6 ♀; Weeping Rock, Zion National Park, May 18, 1944, G. F. Knowlton, 1 ♂. Paratypes are deposited in the collections of the University of California, Utah Agricultural College, Illinois Natural History Survey, and Academy of Natural Sciences of Philadelphia.

Micrasema diteris new species (Pl. VII, fig. 45; Pl. VIII, fig. 52.)

This species is most closely related to *bactro* Ross but differs in that the sclerotized thickenings of the sixth to eighth tergites do not enclose a trapezoidal lateral area; in addition the eighth tergite has a long ventral projection of the lateral margin. The male genitalia are extremely similar to those of *bactro*, differing slightly in that the apex of the claspers is not quite so wide and the cerci are more pointed.

MALE.—Length 6 mm. Color dark brown, the antennae and tarsi slightly lighter, the wings concolorous with the body. General structure typical for the preceding species. First to fifth tergites typical for genus, except that the fifth deviates slightly in having the sclerotized thickening making a sharp ventral lateral angle. Sixth, seventh, and eighth segments, fig. 52, with this thickening extending down the entire basal edge of the segment, around the lateral margin, and recurved along a portion of the posterior margin; on the sixth and seventh tergites the sclerotized thickening cuts off a sharp postero-lateral sclerotized corner, and toward the meson forms a definite emargination in each half of the tergite; the eighth tergite is fairly solidly sclerotized and its lateral edge is produced into a fairly large ventral lobe. Genitalia as in fig. 45. Ninth segment only moderately wide, the dorsal portion forming a narrow sclerotized strap. Cerci divergent, each tapering rapidly from base to a narrow apex, the ventral margin concave. Clasper widened and truncate at apex, bearing a pair of dorsal lobes which arise on the mesal side of the clasper; from dorsal view these look very similar to fig. 45A.

FEMALE.—Length 6.5 mm. Color and general structure similar to male. Genitalia apparently identical with those of *bactro* and *onisca*.

Holotype.—Male; south fork, 6 miles south of Monte Cristo, Utah; August 21, 1942; (Knowlton, Roberts, and Wood).

Allotype.—Female; same data as for holotype.

Paratypes.—UTAH: same data as for holotype, 2 ♂. Beaver Creek, 7000′ elevation, below Monte Cristo, August 21, 1942, G. F. Knowlton, 3 ♂, 4 ♀; Huntsville Canyon, August 25, 1938, 16 ♂, 3 ♀; Huntsville, September 21, 1938, Knowlton and Harmston, 1 ♂, 2 ♀. Paratypes are deposited in the collections of the Utah Agricultural College, Illinois Natural History Survey, and the Academy of Natural Sciences of Philadelphia.

As mentioned above, *Brachycentrus aspilus* Ross must be transferred to *Micrasema*. So also must *Oligoplectrum arizonicum* Ling, of which the late E. P. Van Duzee kindly sent me drawings of the genitalia. This, together with the species described above, gives a total of 12 species now known in the genus *Micrasema* from North America. The following key will serve to outline the identification characters of the males for this group.

Key to Nearctic Males of Micrasema

1. Clasper with posterior aspect of base round, flat, and biscuit-like from caudal view.....**aspilus** Ross
   Clasper with base longer, not round.....2
2. Clasper having no lobes or processes on dorso-mesal margin of apex, figs. 41, 42.....3
   Clasper having a round lobe or other processes arising from mesal margin of apex, figs. 43–45.....7
3. Cercus nearly triangular, the postero-lateral margin, nearly straight, fig. 42A.....4
   Cercus nearly V-shaped with postero-lateral margin deeply incised, fig. 41A.....6
4. Lateral aspect of clasper having apex straight, continuing the posterior contour of body of clasper.....**rusticum** (Hagen)
   Lateral aspect of clasper having apex bent to form a posterior projection, the whole looking like an inverted boot, fig. 42.....5
5. Clasper having heel of boot small, toe with only two teeth, these on mesal side and hardly visible on lateral aspect....**charonis** Banks
   Clasper having heel of boot large and rounded, toe with four teeth projecting sufficiently to be visible on lateral aspect, fig. 42. **bennetti** new species
6. Apex of clasper bent at a considerable angle to base and bearing a row of small teeth at end, fig. 41.....**scotti** new species
   Apex of clasper only slightly curved posterad and without a row of small teeth at end.....**wataga** Ross
7. Base of claspers wide, tapering to a narrow apex.....**sprulesi** Ross
   Base of claspers narrow, the apex widening from it.....8
8. Lobes of tenth tergite having apex pointed and upturned, fig. 43. **scissum** McLachlan
   Lobes of tenth tergite having apex round and flat, figs. 44, 45.....9
9. Sixth, seventh, and eighth tergites having a membranous incised apical portion, the lateral sclerites forming a crescentic horn in lateral view, figs. 52, 53.....10
   These tergites of the usual rectangular shape and bearing a few thin warts along posterior margin, fig. 54.....11
10. Sixth to eighth tergites having each lateral portion of tergite enclosed by a series of sclerotized thickenings, fig. 53...**bactro** Ross
    Sixth to eighth tergites having the apical sclerotized thickenings on each lateral portion extending mesad only along edge of warts, fig. 52.....**diteris** new species
11. Claspers having two projecting processes at apex, fig. 44A. **onisca** new species
    Claspers having only one process at apex.....**arizonicum** (Ling)

Oligoplectrum echo new species (Pl. VIII, fig. 50.)

This species differs markedly from *dimicki,* the only other Nearctic species in the genus, in the broad hood-like cerci, the trilobed tenth tergite, and the shape of the claspers.

MALE.—Length 7 mm. Color dark brown; middle and hind tibiae and tarsi paler brown, the wings uniformly brown but considerably lighter than the body. Maxillary palpus indistinctly three-segmented and fairly short, in repose forming a sausage-like structure held transversely across the face. Tibial spurs very short, middle and hind tibiae each with a single preapical spur a short distance from the apex. Seventh sternite with a broad quadrate projection covered with a brush of dense hair. Genitalia as in fig. 50. Ninth segment composed of a deep and massive ventral portion, which narrows abruptly to a dorsal sclerotized strap. Cerci fused with membranous portion of ninth tergite, the entire structure broad, long, irregularly truncate at apex, and with a deep narrow cleft down the meson which undoubtedly reaches the boundary of the cerci. Tenth tergite composed of a lower plate divided into three sclerotized, slightly clavate, finger-like processes, above which is situated a fourth shorter similar process. Clasper with a short but deep base and a long apical portion which bears a broad ventral lobe truncate along its ventral margin and pointed at apex; the apical portion of the clasper beyond this ventral lobe is somewhat parallel sided and obliquely truncate at tip; from dorsal view the clasper curves slightly mesad and has a minute tooth at apex. Aedeagus curved and cylindrical, simple in structure.

Holotype.—Male; Hot Creek, Mono County, California; May 1, 1937; H. J. Rayner.

Paratypes.—CALIFORNIA: same data as for holotype, 4 ♂. Hatchery Creek, Sample number 2, June 15, 1936, (exact location unknown), 2 ♂. UTAH: Echo, July 24, 1945, G. F. Knowlton, 1 ♂. Charleston, August 14, 1943, Knowlton and Maddock, 2 ♂. Heber, August 14, 1943, Knowlton and Maddock, 1 ♂. Paratypes are deposited in the collections of the California Academy of Sciences, Utah Agricultural College, Academy of Natural Sciences of Philadelphia, and the Illinois Natural History Survey.

Brachycentrus chelatus new species (Pl. VIII, fig. 49.)

This species is most closely related to *occidentalis* Banks but differs in the broad mesal subapical tooth of the clasper, and in the deeply divided tenth tergite.

MALE.—Length 8 mm. Color dark brown, the antennae indistinctly annulate with lighter and dark brown, the tibiae and tarsi with a light area toward the base of each segment; wings light brown, with a few indistinct

paler areas at vein forks. Maxillary palpus 3-segmented, the apical segment short, the palpi in repose held vertically in front of the face. Seventh sternite with a small mesal projection which is longer than broad, parallel sided and rounded at apex. Genitalia as in fig. 49. Ninth segment almost annulate, narrowed dorsally. Cerci large, separated on the meson by a distance equal to half of a cercus; each cercus with a concave ventral margin slightly sinuate at apex, elongate, nearly twice as long as wide. Clasper with a long cushion-like base, narrowing dorsally to form a long curved arm set with stout setae; the dorsal arm has a large triangular mesal projection bearing a row of short setae on its apical margin. Tenth tergite divided two-thirds the distance to base to form a pair of long, narrow, divergent lobes bearing a scattering of minute setae toward apex; these lobes are curved laterad from dorsal view, ventrad from lateral view. Aedeagus tubular and simple.

Holotype.—Male; Mossy Creek, 4.5 miles north of Perry, Georgia; March 17, 1945; (P. W. Fattig).

Brachycentrus adelus new species (Pl. VIII, fig. 51.)

This species is a very close relative of *notabulus* Milne. It differs from it in the large oval cerci, the narrower lateral process of the claspers, and the bifid tenth tergite.

Male.—Length 8 mm. Color dark brown, including antennae, labial palpi, and femora, tibiae, and tarsi; maxillary palpi yellowish. Wings light gray brown, maxillary palpi 3-segmented, the apical segment short and held vertically in repose over the face. Tibial spur count 2–3–3, the spurs fairly short, the preapical spurs situated only a short distance from apex of tibia. Seventh sternite with its mesal margin produced into a cushion-like triangular projection, the sides of the projection flaring widely and reaching almost to edge of segment, the apex of the projection rounded. Genitalia as in fig. 51. Ninth segment very deep, each lateral margin produced anteriorly into a broad arcuate lobe; dorsally the tergite is moderately wide; its posterior margin has a broad shoulder just above the middle line and associated with this is a flange-like invagination. Cerci almost completely fused with ninth tergite, fig. 51B, the two not touching at base, the mesal margins diverging; each cercus short and broad, rounded from dorsal view. Clasper with a short deep cushion-like base and a long dorsal arm which curves dorsad at apex, fig. 51A; the apex is divided into a wide bluntly rounded mesal lobe and a narrow, slightly hooked, lateral lobe. Tenth tergite extremely short, truncate, and having a prominent notch on the meson, fig. 51C.

Female.—Similar in size, color, and general structure to male. Eighth sternite large, its lateral margins converging, the apex only moderately wide. Apical tergite with base humped, apex divided into a pair of small setose lobes, lateral margin produced into a broad truncate flange, fig. 51D.

Holotype.—Male; Ralph Stover Park, Bucks County, Pennsylvania; May 1, 1937; (J. W. H. Rhen). [ANSP.]

Allotype.—Female; same data as for holotype. [ANSP.]

Paratypes.—PENNSYLVANIA: same data as for holotype, 6 ♂. WEST VIRGINIA: along Cacapon River, Capon Bridge, May 1, 1944, Frison, Bennett, and Ross, 10 ♂. Paratypes are deposited in the collections of the Illinois Natural History Survey and the Academy of Natural Sciences of Philadelphia.

EXPLANATION OF FIGURES

PLATE II

Fig. 1.—*Rhyacophila oreia* new species. ♂ genitalia, lateral aspect; A, aedeagus, dorsal aspect; B, clasper, ventral aspect.
Fig. 2.—*Rhyacophila malkini* new species. ♂ genitalia, lateral aspect; A, aedeagus, lateral aspect.
Fig. 3.—*Atopsyche tripunctata* Banks. ♂ wings; A, ♂ genitalia, lateral aspect.
Fig. 4.—*Atopsyche majada* new species. ♂ genitalia, lateral aspect.
Fig. 5.—*Atopsyche erigia* new species. ♂ genitalia, lateral aspect.
Fig. 6.—*Glossosoma pterna* new species. ♂ genitalia, lateral aspect.
Fig. 7.—*Glossosoma schuhi* new species. ♂ genitalia, lateral aspect.

PLATE III

Fig. 8.—*Anagapetus bernea* new species. ♂ genitalia, lateral aspect.
Fig. 9.—*Agapetus gelbae* new species. ♂ genitalia, lateral aspect; A, clasper, ventral aspect.
Fig. 10.—*Polycentropus neiswanderi* new species. ♂ genitalia, lateral aspect; inset, basal lobe of right clasper, posterior aspect.
Fig. 11.—*Agapetus ophionis* new species. ♂ genitalia, lateral aspect; A, clasper, ventral aspect.
Fig. 12.—*Agapetus taho* new species. ♂ genitalia, lateral aspect; A, clasper, ventral aspect.
Fig. 13.—*Polycentropus picana* new species. ♂ genitalia, lateral aspect; A, aedeagus, lateral aspect.
Fig. 14.—*Neureclipsis melco* new species. ♂ genitalia, lateral aspect; A, ♀ genitalia, ventral aspect.
Fig. 15.—*Polycentropus santiago* new species. ♂ genitalia, lateral aspect; A, aedeagus, lateral aspect; B, clasper, ventral aspect.

PLATE IV

Fig. 16.—*Cernotina truncona* new species. ♂ genitalia, lateral aspect; A, cercus, dorsal aspect.
Fig. 17.—*Hydropsyche rotosa* new species. ♂ genitalia, lateral aspect.

Fig. 18.—*Hydropsyche decalda* new species. ♂ genitalia, lateral aspect; A, *Hydropsyche cuanis* Ross, ninth and tenth tergites, lateral aspect.

Fig. 19.—*Hydropsyche elissoma* new species. ♂ genitalia, lateral aspect; A, apex of aedeagus, dorsal aspect; B, ninth and tenth tergites, dorsal aspect.

Fig. 20.—*Plectropsyche hoogstraali* new species. ♂ genitalia, lateral aspect; A, ninth and tenth tergites, dorsal aspect; B, ♀ lateral process of eighth sternite; C, ♀ eighth sternite; D, ♀ ninth tergite, lateral aspect; E, ♂ wings.

Fig. 21.—*Cheumatopsyche zion* new species. ♂ genitalia, lateral aspect; A, clasper, posterior aspect.

Fig. 22.—*Cheumatopsyche wrighti* new species. ♂ genitalia, lateral aspect; A, tenth tergite, posterior aspect.

Plate V

Fig. 23.—*Smicridea caldwelli* new species. ♂ genitalia, lateral aspect; A and B, aedeagus, lateral and dorsal aspects, respectively.

Fig. 24.—*Smicridea utico* new species. ♂ genitalia, lateral aspect.

Fig. 25.—*Smicridea signatus* (Banks). ♂ genitalia, lateral aspect.

Fig. 26.—*Ochrotrichia trapoiza* new species. ♂ genitalia, lateral aspect.

Fig. 27.—*Ochrotrichia phenosa* new species. ♂ genitalia, lateral aspect.

Fig. 28.—*Hydroptila tusculum* new species. ♂ genitalia, lateral aspect; A, ♂ genitalia, ventral aspect; B, ♀ genitalia, ventral aspect; C, aedeagus.

Fig. 29.—*Hydroptila latosa* new species. ♂ genitalia, ventral aspect; A, aedeagus.

Fig. 30.—*Hydroptila quinola* new species. ♂ genitalia, ventral aspect; A, aedeagus.

Plate VI

Fig. 31.—*Pedomoecus sierra* new species. ♂ wings; A, ♂ genitalia, lateral aspect; B, clasper, posterior aspect; C, aedeagus, lateral aspect.

Fig. 32.—*Dicosmoecus canax* new species. ♂ wings; A, ♂ genitalia, lateral aspect.

Fig. 33.—*Neophylax aniqua* new species. ♂ genitalia, ventral aspect; A, male genitalia, lateral aspect.

Fig. 34.—*Neophylax atlanta* new species. ♂ genitalia, lateral aspect.

Fig. 35.—*Oecetis porteri* new species. ♂ genitalia, lateral aspect; A, *Triaenodes melaca* new species, clasper, ventral aspect.

Fig. 36.—*Oecetis daytona* new species. ♂ genitalia, lateral aspect; A, aedeagus, lateral aspect; B, clasper, ventral aspect.

Plate VII

Fig. 37.—*Triaenodes melaca* new species. ♂ genitalia, lateral aspect.
Fig. 38.—*Goera fuscula* Banks. ♂ genitalia, ventral aspect.
Fig. 39.—*Goera archaon* new species. ♂ genitalia, lateral aspect; A, ninth and tenth tergites, dorsal aspect; B, clasper, ventral aspect.
Fig. 40.—*Goera calcarata* Banks. Clasper, ventral aspect.
Fig. 41.—*Micrasema scotti* new species. ♂ genitalia, lateral aspect; A, cercus, dorso-lateral aspect.
Fig. 42.—*Micrasema bennetti* new species. ♂ genitalia, lateral aspect; A, cercus, dorso-lateral aspect.
Fig. 43.—*Micrasema scissum* McLachlan. ♂ genitalia, lateral aspect; A, clasper, dorso-lateral aspect.
Fig. 44.—*Micrasema onisca* new species. ♂ genitalia, lateral aspect; A, clasper, dorso-lateral aspect.
Fig. 45.—*Micrasema diteris* new species. ♂ genitalia, lateral aspect.

Plate VIII

Fig. 46.—*Micrasema aspilus* (Ross). ♂ wings.
Fig. 47.—*Micrasema sprulesi* Ross. ♂ wings.
Fig. 48.—*Oligoplectrum dimicki* (Milne). ♂ wings.
Fig. 49.—*Brachycentrus chelatus* new species. ♂ genitalia, lateral aspect; A, tenth tergite; B, clasper, ventral aspect.
Fig. 50.—*Oligoplectrum echo* new species. ♂ genitalia, lateral aspect.
Fig. 51.—*Brachycentrus adelus* new species. ♂ genitalia, lateral aspect; A, clasper, postero-ventral aspect; B, cerci, dorsal aspect; C, tenth tergite; D, ♀ genitalia, lateral aspect.
Fig. 52.—*Micrasema diteris* new species. ♂ abdominal tergites 5 to 8, lateral aspect.
Fig. 53.—*Micrasema bactro* Ross. ♂ abdominal tergites 5 to 8, lateral aspect.
Fig. 54.—*Micrasema onisca* new species. ♂ abdominal tergites 7 and 8, lateral aspect.

Transactions of the American Entomological Society, Vol. LXXIII.
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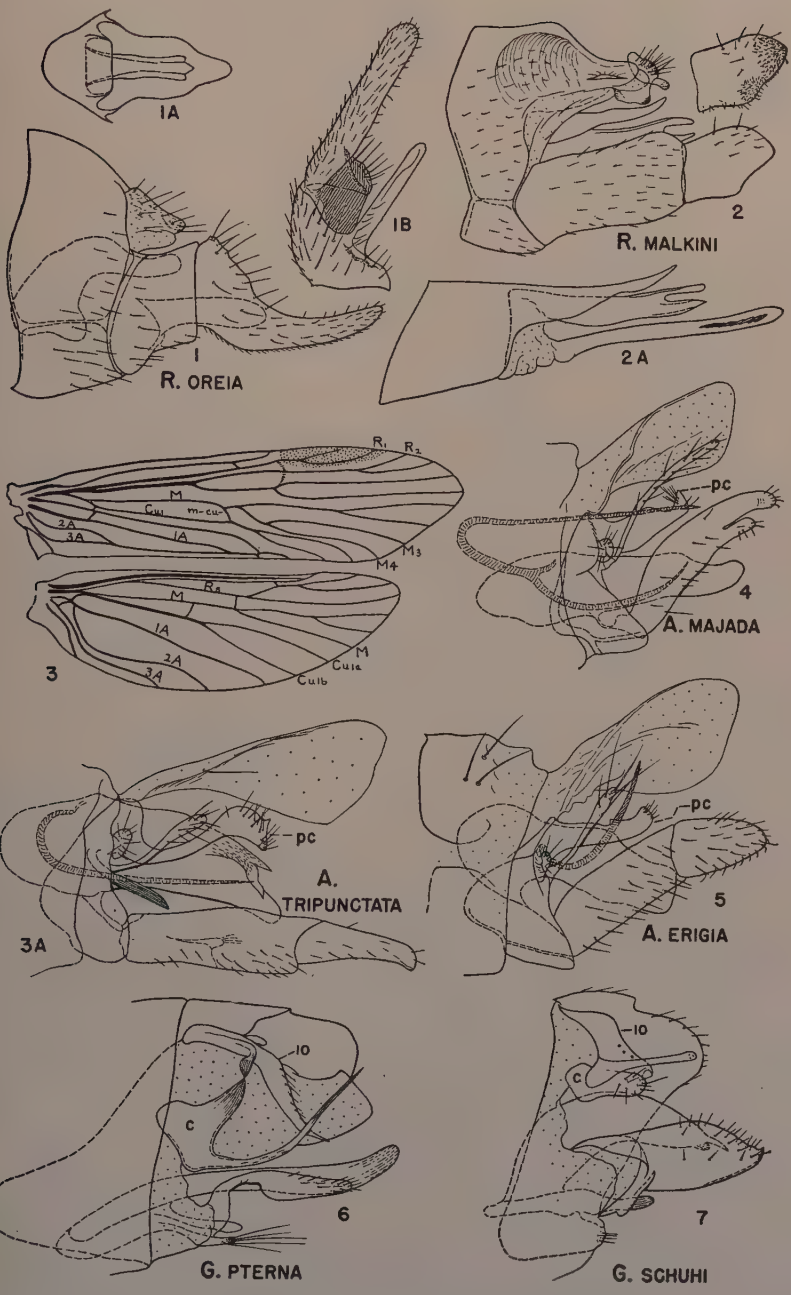
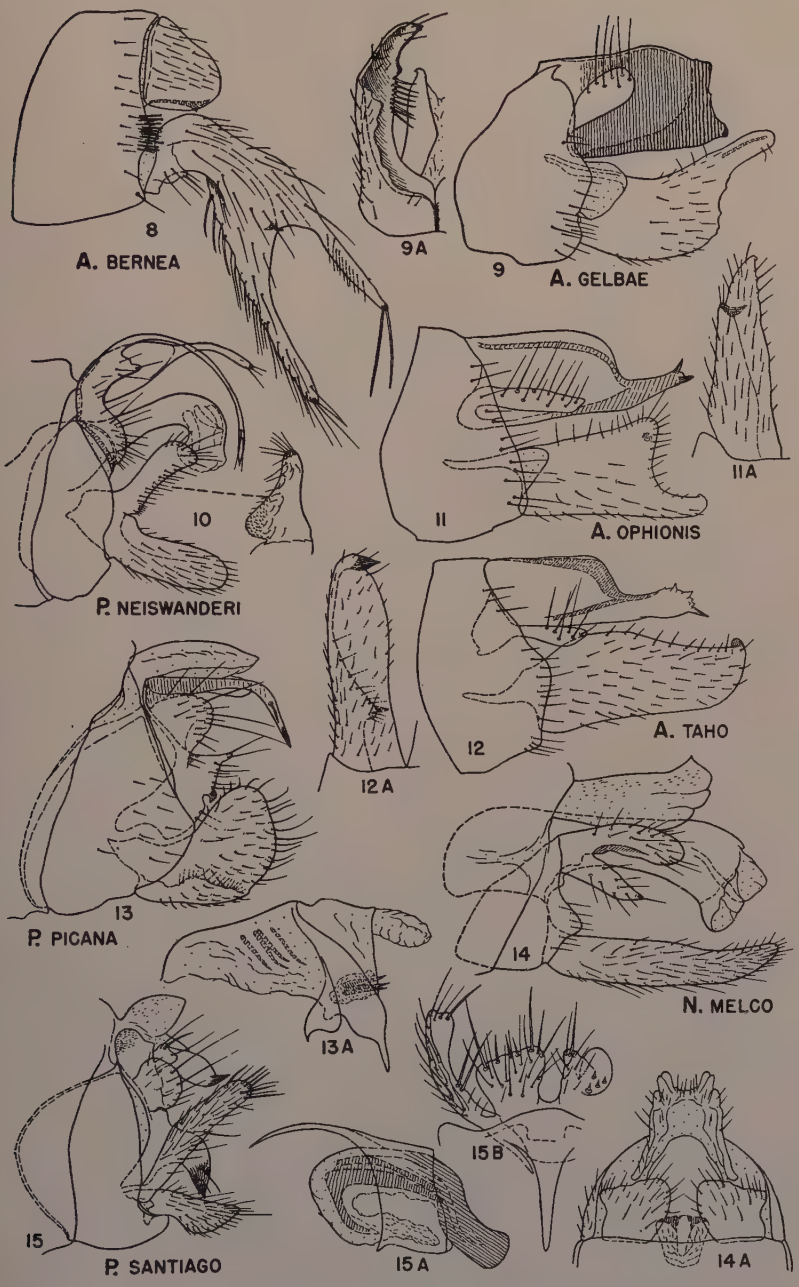


ROSS—NORTH AMERICAN TRICHOPTERA



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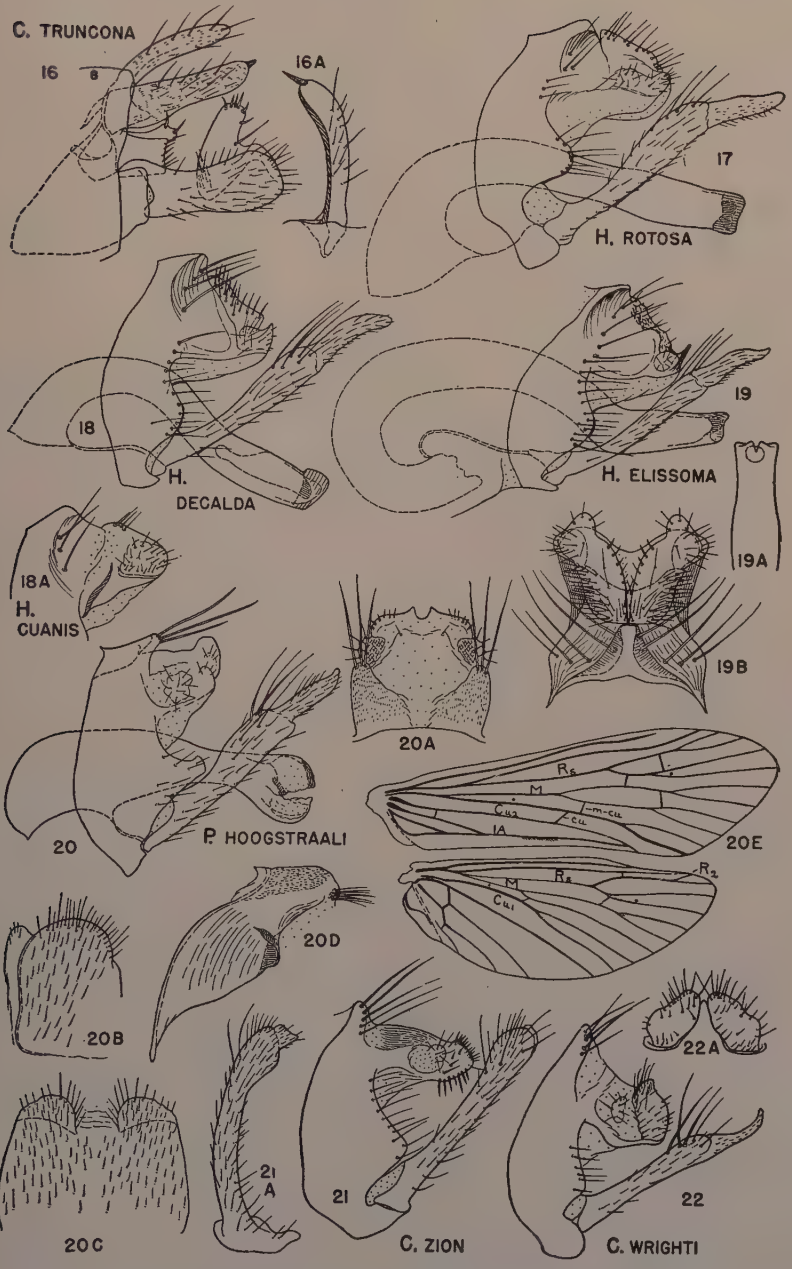

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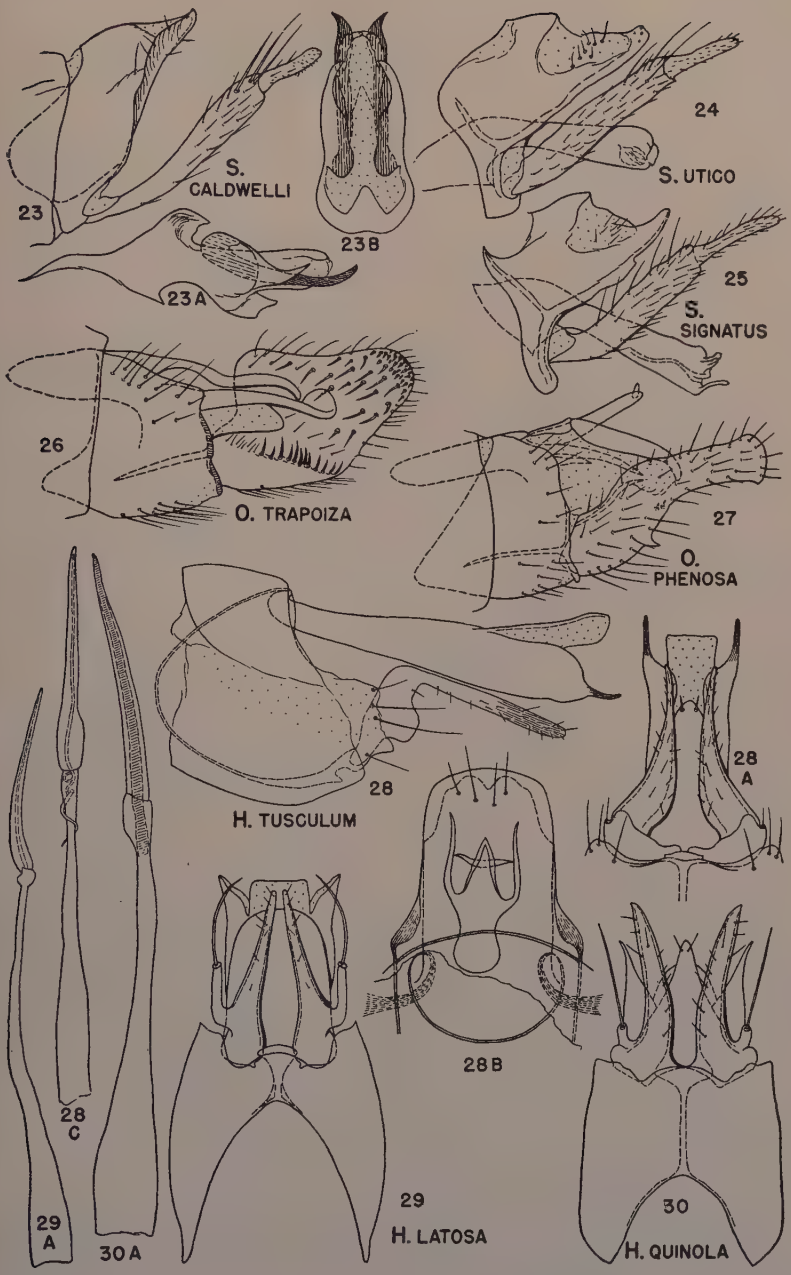

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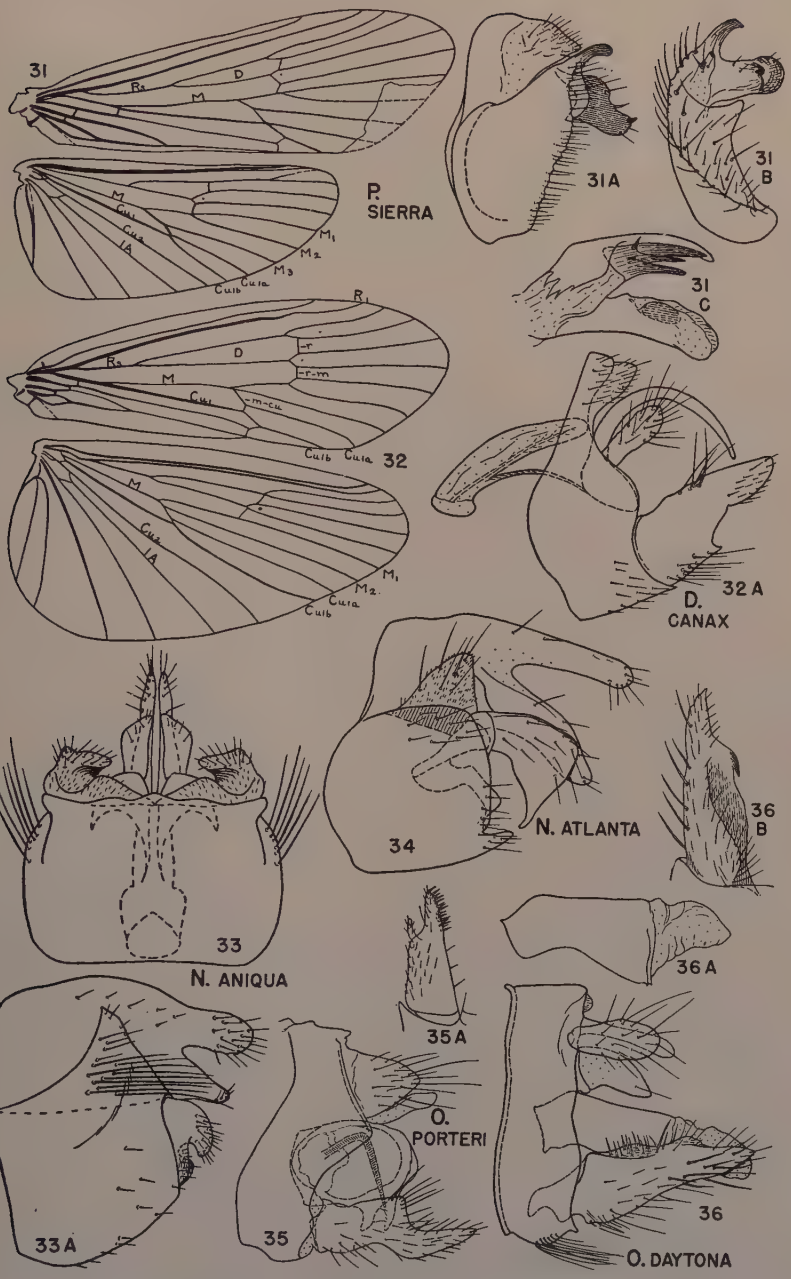

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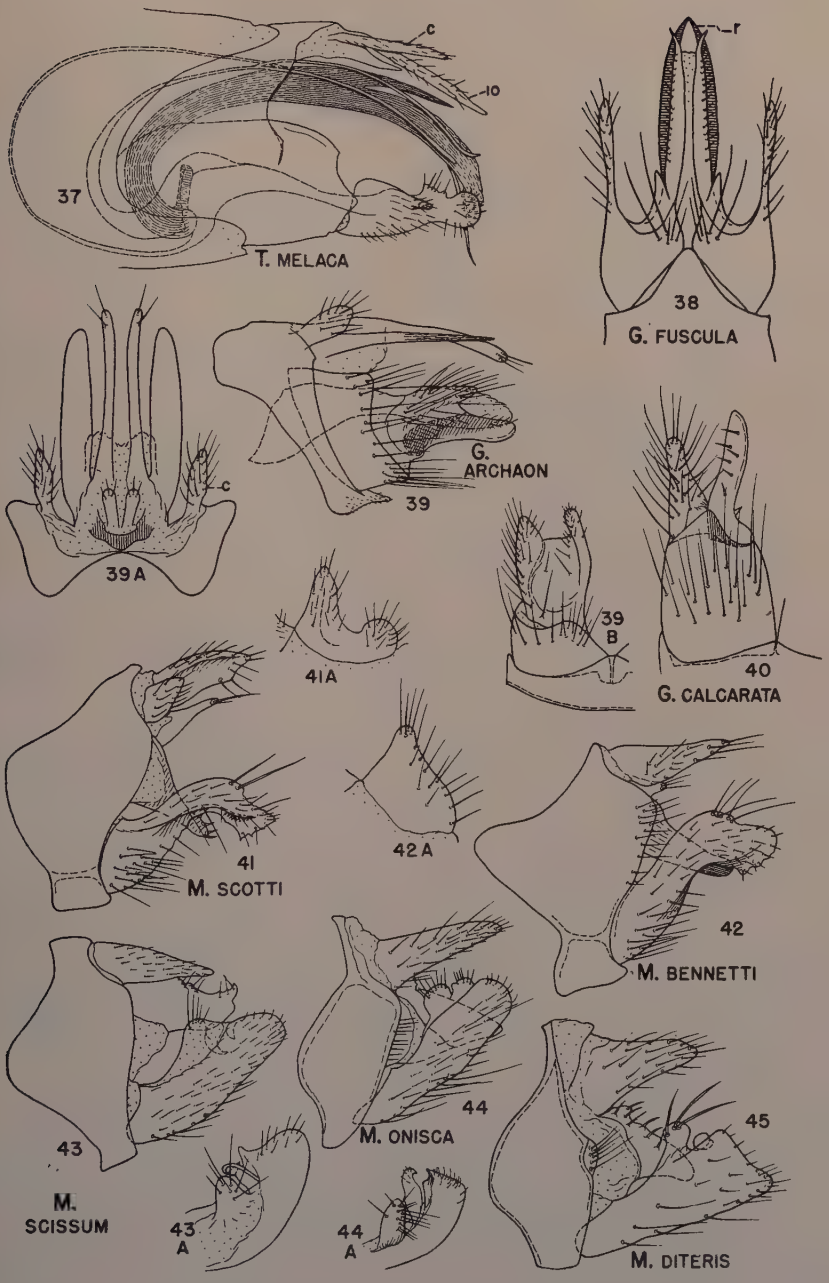

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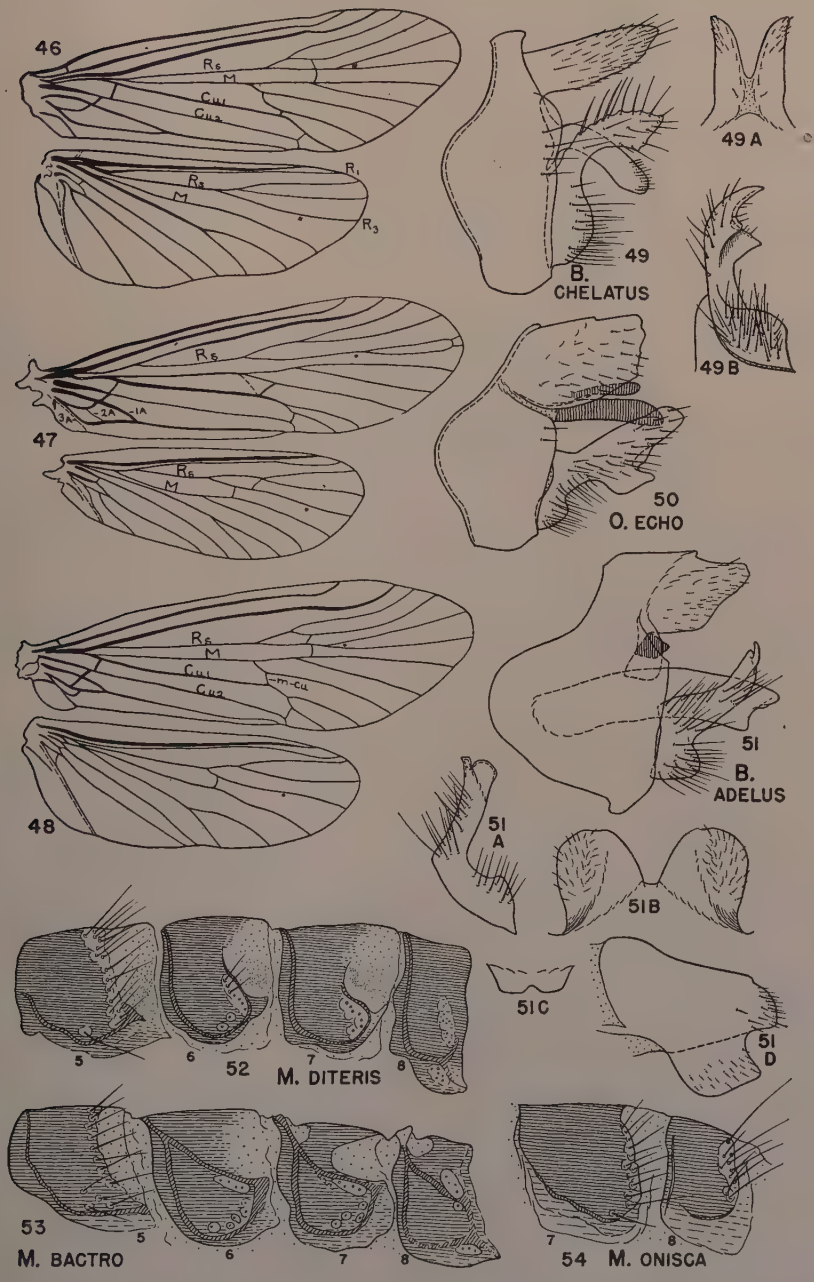

ROSS—NORTH AMERICAN TRICHOPTERA

TWO NEW SPECIES OF SCARABAEIDAE

(COLEOPTERA)

BY MARK ROBINSON

Springfield, Pennsylvania

The types of the new species discussed in this paper are in the collection of the author unless otherwise stated.

Aphodius floridanus new species

This species was collected in cow droppings in a sandy pine woods.

While the present form is a member of the complicated *ruricola* Melsh. group of *Aphodius* the convex elytral intervals and few coarse punctures on the pronotum will separate it at once from other described species.

Rather stout, convex. Black; clypeus, anterior angles of thorax and legs reddish; shining.

Clypeus broadly, not very deeply emarginate, the angle on each side reflexed and well rounded; genae well rounded, barely prominent. Frons with three transversely elongated tubercules. Surface of head alutaceous between the above tubercles and the slightly raised clypeal carina. Punctures on the head are rather fine and are separated from two to three times their diameter with a transverse area between the eyes impunctate.

Pronotum very convex; sides straight in basal half and converging in the anterior half, hind angles are well rounded. The base is slightly sinuate on either side of the median area; basal marginal line well defined. The fine punctures of the disk are separated from four to five times their diameter. The coarse punctures are separated from two to three times their diameter near the angles and gradually diminish in number until they are virtually obsolete on the disk.

Elytral humeri rounded, sides a little wider posteriorly. Striae deep and crenately punctured. Intervals convex basally to strongly so at the apex; the punctures on the intervals are very fine, being barely visible under 35 × magnification.

Mesosternum not carinate. Metasternum slightly concave medially and finely punctate in this area, these punctures are separated from two to four times their diameter; laterally, the punctures are coarse and each bears a yellow hair. Abdominal punctures each bear a yellowish hair. Middle femora with three or four coarse, hair-bearing punctures near the knee; the very fine punctures are extremely sparse. Anterior tibiae tridentate, crenate above the third tooth; spur slightly down curved, acute. Short spur of the middle tibiae a little over half as long as the long spur, acute. Middle and hind tibiae fimbriate with equal spinules. First joint of the hind tarsi a little longer than the next two together.

Length, 5.5 to 6 mm.; breadth, 3 mm.

Type.—♂; five miles west of Daytona, Florida; April 7, 1947; (Mark Robinson).

Paratypes.—?; 2, with the same data as the type. One paratype in the collection of the Academy of Natural Sciences of Philadelphia.

Bolboceras angulus new species

This species is most closely allied to *schaefferi* Boucm. but can easily be distinguished by the arcuate carina behind the clypeal tubercules, the raised ridge at the anterior clypeal edge and lastly the male genitalia is different. The male genitalic claspers in *angulus* are straight in outline while the older species have them flared outward. The transverse pronotal carina is not as well developed in this species as in *schaefferi* and the latter species has an alutaceous elytral sculpturing.

Ferruginous, hairs yellowish-brown; shining.

Anterior clypeal declivity short, margined behind by a raised straight carina; clypeus gradually sloping upwards from this carina to a higher slightly arcuate carina which is terminated on each side by a tuberculiform elevation. Behind this carina is another arcuate, low, sharp carina; this carina is curved in the opposite direction to the more anterior one. Above each eye is a tuberculiform elevation. The punctures are coarse and confluent anteriorly and laterally, posteriorly the head is practically impunctate.

Pronotal lateral margins crenate; just behind the anterior margin on each side is an ill-defined transverse, curved, raised line which is joined at the sides by a lateral carina. The usual four transverse obtuse elevations are present on the disk. The coarse punctures are grouped along the median line, the anterior declivity and near the posterior margin. The fine punctures are evenly, finely distributed.

Elytral striae finely indicated with regularly spaced coarse punctures. The intervals are barely convex and have a few scattered fine punctures over the surface.

Underside and legs with rather long hairs. The left mandible is regularly arcuate externally. The intermediate intercoxal process between the coxae is slightly contracted and about one third as wide as the process in the widest part behind the coxae. The middle and hind tibiae on the outer side are obliquely truncate at the apex.

Length, 10.5 mm.; breadth, 6.5 mm.

Type.—♂; Dog Cañon, Brewster County, Texas.

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THE TRIBE DORCASCHEMATINI (COLEOPTERA: CERAMBYCIDAE)

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Reading Public Museum, Reading, Pennsylvania

(Plates IX to XIV)

The Lamiine tribe Dorcaschematini is a relatively small one, the components of which occur nearly throughout the world but which are most abundant in species in the Indo-Australian region. However, even from that area, individuals, with the exception of only one or two species, are rather rare in collections and it was necessary to borrow material from a great many institutions in order to obtain series of sufficient length.

The present study was based primarily upon the fine collection at the Academy of Natural Sciences of Philadelphia [ANSP] where a large share of the types of new species has been deposited. To supplement this, loans of material were obtained from the following: American Museum of Natural History [AMNH]; Bishop Museum, Honolulu [BM]; British Museum (Natural History) [BMNH]; California Academy of Sciences [CAS]; Carnegie Museum [CM]; Chicago Natural History Museum [CNHM]; Cornell University [CU]; Kansas University [KU]; Lionel Lacey, New Rochelle, N. Y.; Musée Congo Belge, Terveren [MCB]; Museum of Comparative Zoölogy [MCZ]; Musée Royal de Histoire Naturelle de Belgique [MRHNB]; University of Minnesota [Mina. U.]; National Museum of Southern Rhodesia [NMSR]; Rijksmuseum van Natuurlijke Historie, Leiden [RNHL]; Naturhistoriska Riksmuseum, Stockholm [RNS]; Reading Public Museum [RPM]; Texas Agricultural Experiment Station [Tex. Ag.]; and U. S. National Museum [USNM].

To the curators of the above collections the authors extend their sincere thanks for their cooperation and for the loan of specimens. The authors are deeply grateful to Mr. E. T. Cresson, Jr., and

Mr. James A. G. Rehn for use of the facilities of the Academy of Natural Sciences of Philadelphia and for their hearty cooperation and encouragement throughout the course of this study. Mr. Lionel Lacey has, as always, been especially helpful, as has Dr. J. Linsley Gressitt. To Dr. H. E. Hinton, of the British Museum, the authors are indebted for making numerous comparisons with type specimens as well as for loans of material. To Mr. Keith M. McKeown likewise the authors are indebted for his kindness in making notes and sketches of forms represented in the Australian Museum.

This study in part was made possible through the assistance received through a Research Grant for 1945 and for 1946 from the Pennsylvania Academy of Sciences.

Tribal Characters

This tribe is easily distinguished from all others by the unique character of the antennal scape. This segment is much shorter than head, strongly expanded, and densely asperate on its entire dorsal surface.

Elongate-oblong, rather slender or extremely so, cylindrical; small or moderate in size. Head across eyes much wider than prothorax, not retractile; front subquadrate or strongly transverse; eyes deeply emarginate, lower lobes subquadrate or transverse. Antennae always longer in male than in female, much longer than body, rarely fringed beneath; scape short, robust, strongly obconical, densely asperate above, without a cicatrix; third segment much longer than first, rest variable. Pronotum feebly transverse to extremely elongate, distinctly narrower than elytra at base, unarmed laterally; basal and apical transverse sulci distinct. Scutellum transverse, nearly semicircular. Elytra simply punctate, never granulate. Procoxae small, the cavities, closed behind, angulated externally; mesocoxal cavities open and angulated. Legs variable in length; mesotibiae distinctly sulcate on dorsal surface; tarsi with first segment slightly elongate, claws divaricate.

In general appearance this tribe resembles the Hippopsini but is readily distinguished by the short scape. The Gnomini likewise appear to be related but the scape there attains the apex of the pronotum and bears a distinct cicatrix at its apex.

There is a remarkable uniformity in almost all the morphological features; only the eyes, relative length of legs, and the varied proportions of the pronotum and of the antennal segments provide means of segregating the species into the various genera.

Origin and Distribution

The present-day distribution of this tribe is of considerable interest. Representatives occur throughout the Ethiopian faunistic region and in most of the Indo-Australian region, except for New Zealand and the main portion of Australia; in the extreme eastern portion of the Palearctic region a few species occur, *Olenecamptus octopustulatus* and *O. nigromaculatus* being found as far north as Siberia. No forms are known from western Asia or from Europe. In the Western Hemisphere, four species in two genera are found, all confined to the United States east of the Rocky Mountains, none apparently extending into Mexico nor into the Antilles. In the Pacific Ocean, forms of *O. bilobus* exist in the Carolinas and in the Solomons; in the latter group of islands and in Fiji a subspecies of *Cylindrepomus grammicus* is to be found. From this broadly interrupted distribution and from the relative scarcity of its members, it appears logical that the tribe now is a remnant of a formerly much more widely distributed group, whose members were more abundant in individuals and species than at present. Its North American distribution indicates that representatives did not reach this continent until relatively recent times or that its arrival was followed by climatic changes which opposed its further dissemination.

In the Indo-Australian region, the subspeciation of the few widely distributed species is of interest. *Olenecamptus bilobus* exhibits a type of distribution, rare in this tribe, which is *radial* in relation to the mainland of Asia. One of the radiae extends from Queensland into New Guinea and New Britain, through the Moluccas, the Philippine Islands, and the Carolina Islands into Formosa and Japan; the other reaches through the Sunda Islands, including Borneo, into the Malay Peninsula and the mainland. In *Cylindrepomus* the distribution is less extensive and is *transversal.* As examples of this the case of *C. grammicus,* which occurs from Celebes into New Guinea and New Britain, and through the Solomon Islands as far as Fiji, and of *C. preregrinus,* which is found in Borneo and the Philippines, can be cited.

In the Indian Ocean area, representatives found in Madagascar and the Seychelles show close affinity to Indian species but not to

any Ethiopian forms. Only the genus *Olenecamptus* is represented in the Ethiopian region; the species are there quite distinct from Asiatic forms, with the exception of the group of which *O. battangi* is an example. One further exception of the group should be pointed out, *O. hofmanni* appears to be quite close to a species, *O. circulifer,* which is confined to the Philippines. But as the latter is known to the authors only by the illustration, actual comparison of specimens might prove that the apparent likenesses are actually only superficial.

Dorcaschema succineum Zang, from the Baltic amber (Lower Oligocene), is the only reported fossil representative of the tribe.

Removed Genera

Brachyolene Aurivillius and *Protonarthron* Thomson (placed here by Breuning) have nothing in common with the other members of the tribe and must therefore be removed.

Key to Genera

1. First segment of metartarsi distinctly longer than that of the other tarsi ..... **Dorcaschesis**
   First segment of metatarsi not distinctly elongate 2
2. Eye with lower lobe strongly transverse, never taller than gena, usually distinctly shorter, the lower posterior angle broadly rounded; Western Hemisphere 3
   Eye with lower lobe subquadrate, almost always very much taller than gena, the lower posterior angle angulate or narrowly rounded; Eastern Hemisphere 4
3. Elytra with apices rounded ..... **Dorcaschema**
   Elytra with apices acuminate ..... **Hetoemis**
4. Forelegs distinctly longer than others ..... **Olenecamptus**
   Legs subequal in length or hind ones longer than others 5
5. Antennae with fourth segment longer than third .... **Cylindrecamptus**
   Antennae with fourth segment distinctly shorter than third 6
6. Metafemora not nearly attaining tip of abdomen ... **Microlenecamptus**
   Metafemora attaining the tip of abdomen, or surpassing it 7
7. Elytra with apices emarginate, dentate at outer angle; body form robust ..... **Macrocamptus**
   Elytra with apices not emarginate, usually dentate or acuminate; body form slender ..... **Cylindrepomus**

OLENECAMPTUS Chevrolat

1835. *Olenecamptus* Chevrolat, Mag. Zool., v, Ins., pl. 134. Thomson, Class. Ceramb., 1860, p. 104, 108; Syst. Ceramb., 1864, p. 386. Pascoe, Trans. Ent. Soc. Lond., (3), III, 1866, p. 259, 316. Lacordaire, Gen. Col., IX, 1872, p. 457, 458. Schwarzer, Senckenbergiana, VIII, 1926, p. 287. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 542.

1857. *Authades* Thomson, Arch. Ent., I, p. 191; Class. Ceramb., 1860, p. 104, 108; Syst. Ceramb., 1864, p. 386.

1860. *Ibidimorphum* Motschulsky, in Schrenk's Reis. Amurland, Col., p. 152. Blessig, Horae Soc. Ent. Ross., IX, 1873, p. 191 (31). Ganglbauer, Best.-Tab., XIII, 1884, p. 86 (520).

1860. *Ibidiomorphum* Motschulsky, in Schrenk's Reis. Amurland, Col., pl. X.

While closely related to *Cylindrepomus,* this genus is at once distinct in having the forelegs distinctly longer than the others; the eye with lower lobe strongly widened posteriorly; and the antennae are not fringed beneath.

Elongate-oblong, comparatively robust, cylindrical. Head with front transverse; eye with lower lobe large, strongly widened posteriorly, posterior, lower angle distinct. Pronotum elongate in male, sometimes subquadrate in female; disk usually transversely rugose or carinulate. Elytra feebly tapering in male, usually slightly widened posteriorly in female; apices obliquely truncate, the exterior angle usually dentate; disk punctate. Mesosternal process emarginate apically; fifth sternite longer than third and fourth together in female, about equal to these two in male. Legs rather elongate, the anterior pair the longest; femora subpedunculate and gradually clavate, subcompressed; profemora and protibiae usually finely serrate beneath in male. Antennae two to two and a half times body length in male, in female one and a half to two times body length, in male usually serrate beneath and the dorsal surface of basal segments asperate; third segment at least three times length of scape, less elongate in female; fourth distinctly shorter than third and usually shorter than fifth; eleventh somewhat longer than tenth, especially in male.

GENOTYPE: *Olenecamptus serratus* Chevrolat, by monotypy.

Key to Species *

1. Elytra entirely gray or white pubescent, immaculate or with glabrous maculae.....2
   Elytra with tomentose maculae or vittae.....5
2. Elytra entirely pubescent.....3
   Elytra with glabrous maculae.....4
3. Upper surface entirely yellowish pubescent.....**quietus**

* This key does not include *confluens* Breuning.

Elytra gray pubescent; pronotum gray with yellow vittae. **griseippenis**

4. Legs black; elytra squarely truncate at apices, without trace of a tooth ..... **nigromaculatus**
   Legs paler than body; elytral apices obliquely truncate, dentate. **clarus**
5. Elytra each with a short vitta behind scutellum close to suture 6
   Elytra without such a vitta 15
6. Elytra with discal markings white or whitish 7
   Elytra with discal markings distinctly yellow 9
7. Head behind vertex without white markings; elytral markings chalky-white ..... **dominus**
   Head with whitish markings behind vertex; elytral markings not chalky 8
8. Elytral postscutellar sutural vitta attaining middle without interruption, attenuate posteriorly; head with vittae behind vertex abbreviated ..... **albolineatus**
   Elytral postscutellar sutural vitta interrupted near basal quarter, rounded posteriorly; head with vittae behind vertex nearly entire. **multinotatus**
9. Elytral disk with no markings on basal half except the postscutellar vitta ..... **sarawakensis**
   Elytral disk with additional markings 10
10. Elytra on disk each with only two series of markings, one along suture, the other along middle 11
    Elytral disk with at least three series of markings 12
11. Pronotum with a fine vitta each side of median line on anterior half. **tagalus**
    Pronotum without any vittae on disk ..... **strigosus**
12. Head above with a vitta each side of middle, reaching from occiput to vertex 13
    Head above without vittae 14
13. Elytra with anterior sutural vitta at least attaining middle; pronotal disk with a vitta each side of middle ..... **malayensis**
    Elytra with anterior sutural vitta confined to basal quarter; pronotum at most with small maculae on disk anteriorly. **compressipes**
14. Body above glabrous or nearly so, shining; elytra with sutural vitta attaining scutellum or nearly so; body length 13 to 18 mm. **sandacanus**
    Body above distinctly pubescent, subopaque; elytra with sutural vitta well separated from scutellum; body length more than 18 mm. **pseudostrigosus**
15. Pronotum without any white or pale markings on disk, except sometimes a small macula each side of middle on basal margin 16
    Pronotum with white or pale vittae or maculae on disk 22

16. Pronotal disk covered with very distinct punctures.....**patrizii**
Pronotal disk without distinct punctures, usually rugose.....17
17. Pronotum with a small white macula each side of basal margin...18
Pronotum without any maculae on basal margin.....20
18. Scutellum white tomentose.....19
Scutellum not white.....**madecassus**
19. Elytra each with a white macula at middle of disk, as well as one towards base.....**serratus**
Elytra each with a white macula at apical or basal third, or both, but never any at middle of disk; there is an additional macula behind scutellum, often common to both.....**bilobus**
20. Head with a large white macula covering most of its upper surface. **triplagiatus**
Head without any maculae above.....21
21. Elytra white pubescent at base, a dense tomentose white macula, annulated with brown, near scutellum.....**basalis**
Elytra not white pubescent at base, without maculae on anterior half, each with a small macula at middle and another at apical quarter.....**blairi**
22. Pronotum with a single, broad, median, white vitta.....23
Pronotum with maculae or vittae each side of disk.....25
23. Elytra with lateral incisions in the white vitta nearly attaining suture. **albidus**
Elytra with lateral incisions very shallow.....24
24. Elytra with lateral incisions in white vitta single, V-shaped. **marginatus**
Elytra with lateral incisions in white vitta broad, rectangular or rounded, three in number each side.....**cretaceus**
25. Pronotum with a single white macula each side of disk near anterior margin; elytra with a broad common white sutural vitta. **superbus**
Pronotum otherwise maculate or vittate; elytra without a common sutural vitta.....26
26. Pronotum with two distinct white maculae each side of middle of disk.....27
Pronotum without two maculae each side of disk.....36
27. Elytra each with three or four white maculae more or less coalesced to form a broad vitta.....**lineaticeps**
Elytra each with the maculae not coalescent to form a median vitta.....28
28. Elytra with a common basal macula.....29
Elytra without a common basal macula.....31
29. Elytra with a narrow, common, transverse, postmedian macula. **senegalensis**
Elytra without a common postmedian macula.....30

30. Elytra densely orange-tawny pubescent, with large, white maculae, annulate with dark brown pubescence.....**macari**
Elytra thinly white pubescent, with large white maculae surrounded with glabrous brown annuli.....**hofmanni**
31. Elytra sparsely white pubescent, with large tomentose maculae occupying the greater portion of the area.....**circulifer**
Elytra gray or tawny pubescent, with maculae smaller.....32
32. Scutellum white.....**siamensis**
Scutellum not white.....33
33. Body beneath black.....**octopustulatus**
Body beneath not black.....34
34. Elytra each with six discal maculae.....**similis**
Elytra each with four discal maculae.....35
35. Maculae on head above diverging anteriorly.....**affinis**
Maculae on head above converging anteriorly.....**optatus**
36. Head with three white vittae above.....55
Head with at most two white vittae above.....37
37. Elytra each with three irregular transverse white maculae and one rounded at apex.....**diversemaculatus**
Elytra not so.....38
38. Elytra each with two vittae on disk, one broader, near suture, the other narrow, more lateral, coalescent apically.....**albovittatus**
Elytra each not bivittate.....39
39. Head above with maculae or vittae converging anteriorly and coalescing on vertex.....40
Head above with markings not converging anteriorly nor coalescent.....46
40. Scutellum white.....41
Scutellum not white.....44
41. Elytra with a common basal macula.....45
Elytra without a common basal macula.....42
42. Elytra on apical half with two dark gray maculae ocellated with white.....**giraffa**
Elytra without ocellated gray maculae.....43
43. Elytra with an irregular common fascia at basal third, no basal macula present.....**indicus**
Elytra without a common fascia, a macula present at base of each disk.....**signaticollis**
44. Elytra each with four large white maculae, the last two sometimes coalescent.....**vittaticollis**
Elytra each with two small maculae near middle of disk, sometimes coalescent, and a very small one at base.....**rhodesianus**
45. Elytral common basal macula obcordate.....**detzneri**
Elytral common basal macula transverse, fasciform.....**hebridarum**
46. All maculae on upper surface poorly defined; elytra with sides broadly white.....**nubilus**

Maculation sharply defined; elytra laterally not broadly white....47
47. Pronotal discal vittae maculiform, not attaining apical or basal transverse sulcus.....**fouqueti**
Pronotal discal vitta not maculiform, surpassing apical or basal transverse sulcus.....48
48. Pronotal discal vittae not attaining basal margin.....49
Pronotal discal vittae attaining base.....51
49. Elytra each with a large macula adjacent to scutellum.....50
Elytra each with basal macula small, removed from scutellum. **somalius**
50. Elytra each with the three maculae before apex linear, small, the basal macula surrounding scutellum.....**anogeissi**
Elytra each with the three maculae before apex rounded, moderate in size, the basal macula not surrounding scutellum....**palawanus**
51. Elytra each with a short, broad vitta.....52
Elytra without vittae.....53
52. Elytral vitta extending from basal third to apical quarter, irregular. **australis**
Elytral vitta extending from near base to slightly behind middle, regular.....**vittatus**
53. Elytra with no more than three maculae, basal one, if present, very small.....**olenus**
Elytra with six maculae, basal one large and always present.....54
54. Elytra with a small macula laterally behind basal macula, sutural postmedian spot more or less rounded, small.....**battangi**
Elytra without a small macula behind basal one, sutural postmedian spot large, elongate, sublinear, just before apical macula an additional spot at suture, very small.....**zanzibaricus**
55. Head above with the three vittae coalescent on vertex; S. E. Africa. **tessellatus**
Head above with the three vittae entirely separate; French Indo-China.....**quadriplagiatus**

Olenecamptus cretaceus Bates (Pl. XI, fig. 1.)

1873. *Olenecamptus cretaceus* Bates, Ann. Mag. Nat. Hist., (4), XII, p. 314. Savio, Not. d'Ent. Chin., II, 1929, p. 3, fig. 2. Matshushita, Journ. Fac. Agr. Hokkaido, XXXIV, 1933, p. 352. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 545, fig. 545.

The long, common, sutural, white area of the elytra is shared by three species. In the present one the elytra are obliquely, emarginately truncate, the external angle being barely prominent; the white area of elytra is less strongly retracted at the extreme base; and the pronotum has the sides nearly straight, its form not extremely elongate.

Female. Elongate-oblong, slender, cylindrical; pale reddish-brown. Head above with two broad, white, tomentose fasciae which are convergent almost from base, and with a narrower vitta behind the lower lobe of each eye, which is narrowed medially; anterior margin of eye margined with white tomentum; remaining surface, thinly yellowish-gray pubescent. Pronotum thinly, ochraceous-brown pubescent, with a broad, white, tomentose vitta either side of middle, coalescent apically and basally, separated more widely at middle. Scutellum entirely white tomentose. Elytra with thin, ochraceous-brown pubescence, medially with a broad, common, white, tomentose vitta, slightly narrowed at base and apex, the outer margin of which is emarginate on basal third, just behind middle and on apical quarter, a small, round, brownish macula just before median emargination. Beneath piceous, white tomentose, except prosternum, which is broadly white vittate laterally over procoxae; the tomentum thinner medially on abdomen, first four sternites each with a small dark macula laterally, largest on first sternite and gradually diminishing to fourth. Legs light reddish-brown, thinly pale gray pubescent, tarsi dark reddish-brown. Antennae light reddish-brown, extreme apices from third segment (except eleventh) dark brown, thinly clothed with pale gray pubescence.

Head above and on sides feebly rugose; front strongly transverse, sparsely asperate; eye with lower lobe strongly widened posteriorly, lower margin oblique; antennal tubercles prominent, well separated, with a robust tooth at apex. Pronotum feebly elongate; apex slightly wider than base, feebly widened medially; apical and basal sulci broad, deep, apical one curved medially; disk transversely rugose. Scutellum strongly transverse, sides and apex broadly arcuate. Elytra slightly widened behind middle; apices rounded, obliquely truncate at suture, with an obtuse tooth at apex; entire surface (except that covered by vitta) with coarse, close-set punctures, at apical quarter they become much finer and nearly obsolete. Mesosternal process elevated medially; deeply, bilobedly emarginate apically. Antennae one and one-half times body length; scape reaching to basal third of head, basal half sparsely, apical half densely, asperate; third segment smooth, three times length of scape; remaining segments subequal, except eleventh, which is distinctly longer than tenth.

Length 21.7 mm.; width 5.5 mm.

Distribution.—Japan.

JAPAN: ♂, ♀; no locality data; [CM; BMNH].

Remarks.—This species is reported from China and Korea by Savio and Breuning respectively, but perhaps these reported individuals are racially distinct.

Olenecamptus marginatus marginatus Schwarzer (Pl. XI, fig. 2.)

1925. *Olenecamptus marginatus* Schwarzer, Ent. Blätt., XXI, p. 63. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 548, fig. 549.

Marginatus is distinct from *cretaceus* in having elytra with a single incision on each lateral margin of the common white vitta and in this case is shaped like a "V," not like a "U" as in *cretaceus,* which species also has two incisions each side.

Male. Elongate-oblong, rather slender, cylindrical; light to medium reddish-brown, thinly clothed with pale tawny pubescence; with dense, white tomentose markings as follows: head above with a broad median vitta, narrowing feebly towards vertex, at occiput a small, triangular, brown spot; a narrow vitta behind eye which becomes very attenuate posteriorly; genae nearly entirely white pubescent. Pronotum with a broad, white, median vitta enclosing a very narrow, brown vitta medially which nearly attains the apex of pronotum but extends posteriorly only to the basal sulcus. Scutellum entirely white. Elytra with a broad, common, median vitta, narrow basally, widest just behind humeri and then gradually attenuate apically, lateral margin just behind middle with a small V-shaped indentation. Beneath dark brown, densely grayish-white pubescent, laterally broadly white pubescent; first sternite laterally with an indistinct, darkish, more or less elongate macula, the second and third each with a single rounded one. Legs light to medium reddish-brown, thinly pale gray pubescent. Antennae with scape and third segments medium reddish-brown, remaining segments paler and the apices of those segments piceous.

Head above finely alutaceous; front moderately densely asperate; antennal tubercles well separated basally, at apex with a short, robust tooth. Pronotum elongate; base and apex subequal in width; apical sulcus wide, rather deep and curved medially, basal one wide, more shallow, more or less straight; disk at middle rather coarsely, transversely rugose. Scutellum transverse, sides nearly straight, feebly oblique, apex broadly arcuate. Elytra basally rather coarsely, closely punctured, punctures finer apically; apex shortly, obliquely truncate, with a short, robust tooth at apex. Mesosternal process basally feebly elevated medially, apex rather deeply, angularly emarginate; fifth sternite feebly emarginate at apex. Antennae about twice body length; scape reaching to beyond middle of head, dorsal surface coarsely, moderately densely asperate, third segment about five times length of scape, dorsally finely, rather densely asperate at base, less dense apically; fourth segment longer than fifth, finely, sparsely asperate; remaining segments gradually shorter, except eleventh, which is longer than tenth; serrate ventrally through fifth segment. Tibiae and femora of front legs serrate ventrally.

Length 23.7 mm.; width 5.2 mm.

Type locality: Kosempo, Formosa.

Distribution.—Formosa.

FORMOSA: ♂; Hori, June, 1935; [CAS].

Olenecamptus marginatus intacta Breuning

1940. *Olenecamptus cretaceus intacta* Breuning, Nov. Ent., suppl. 3, 1, p. 547, fig. 546.

"The longitudinal white band of the elytra is not incised on the lateral edge. Type: one male, Nikko, (Japan), in Itziner collection." (A translation of the original description.)

Olenecamptus superbus Pic (Pl. XI, fig. 7.)

1908. *Olenecamptus superbus* Pic, Mat. Étud. Longicornes, VII, p. 16. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 547, fig. 544.

Very similar to *O. cretaceus* Bates, but lacks the broad, white vittae on head and pronotum; the common elytral vitta is much narrower, especially at base and apex, and does not attain the apices.

Female. Elongate-oblong, rather slender, cylindrical; pronotum medium reddish-brown, elytra and head paler; entirely clothed with fine, moderately dense, grayish pubescence. Head at base either side of middle with two, small, chalky white maculae, and a rather indefinite one between vertex of same color. Pronotum with two, rounded, white maculae just behind apical sulcus, one either side of middle. Scutellum entirely cretaceous. Elytra with a broad, common, white, sutural vitta which is attenuate basally and apically, laterally with three emarginations, one at apical third and one at basal third, equal in size, and a larger one at middle, just behind humeri a single, very small, round, white macula. Beneath piceous, densely gray pubescent, with a broad, white vitta each side from apex of prosternum to tip of abdomen. Legs and antennae same color as head and elytra, moderately thinly, gray pubescent.

Head above finely alutaceous; front finely alutaceous and finely, very sparsely asperate; antennal tubercles subapproximate basally, at apex with a short, obtuse tooth. Pronotum slightly elongate; base and apex subequal in width; basal and apical sulci curved and widened medially; disk moderately transversely rugose. Scutellum transverse, sides and apex arcuate. Elytra with sides nearly parallel, apices feebly, obliquely emarginate at suture, the outer angle with a small tooth; disk with coarse, close-set punctures, these are but little finer towards apex. Mesosternal process feebly elevated medially, apical margin strongly, deeply emarginate; fifth sternite apically strongly emarginate. Antennae about one and one-half times body length; scape reaching beyond middle of head, strongly asperate dorsally; third segment three times length of scape, feebly asperate; fourth distinctly longer than fifth, remaining segments gradually shorter, except eleventh which is distinctly longer than tenth.

Length 21 mm.; width 4.6 mm.

Type locality: Yunnan, China.

Distribution.—Southern China.

CHINA: ♀; Mong-Tzé, Yunnan [paratype—USNM]. ♂; Dje-Kou-La, N. W. Yunnan, alt. 1600 m. [MRHNB]. ♀; Yunnan prov. [MRHNB].

Olenecamptus albovittatus Breuning

1936. *Olenecamptus albovittatus* Breuning, Festschr. E. Strand, 1, p. 319; Nov. Ent., suppl. 3, 1, 1940, p. 557, fig. 575.

"Close to *bilobus* Fab., but: Shorter, lower ocular lobe as long as genae, pronotum transverse, not transversely rugose; elytra apically slightly narrowed, briefly truncate, the marginal angle rounded; the legs shorter. Red-brown, yellowish tomentose, with silky sheen, very fine, in form of a vitta each side of pronotal disk, which here appears somewhat darker; on sides of pronotum a fine yellowish-white vitta, which then continues as a broader band over sides of sterna and abdomen to apex; each side of pronotal base a whitish transverse macula. Elytra finely tomentose, each with two broad, sharply defined, yellowish-white vittae, which coalesce towards the middle and thereby almost cover the whole posterior half, from side to sutural margins. Underside, legs, and antennae finely yellowish-white tomentose, tomentum denser on abdomen, very fine on antennae. 12½ mm. Type from Borneo: Sarawak, Mt. Merinjak in Sarawak Museum."

This species, unseen by the present writers, who present the above translation of the original description, appears to be similar in its elytral maculation to *Macrocamptus andamanicus;* possibly it may prove actually to belong in this latter genus.

Olenecamptus lineaticeps Pic

1916. *Olenecamptus lineaticeps* Pic, Mat. Étud. Longicornes, x, p. 18. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 549, fig. 551.

"Moderately elongate, nearly opaque, black, spotted with white in places; elytra brownish, with wide white patterns; legs testaceous. Head large, for the greatest part white, dark at the sides, with two lines equally dark on the vertex behind eyes. Prothorax a little longer than wide, feebly wrinkled, quadrimaculate in white on the disk. Elytra fairly broad but not very long; each disk with white patterns as follows: a large subtriangular basal spot, a long median band, and a posterior band, strongly pitted outside towards the middle, nearly straight on the inner side. Beneath dark, in greater part covered with white pubescence. Legs testaceous.

"Length 17 mm. Tonkin: Hanoi (coll. Pic). This species is very distinct owing to its elytral patterns; it may be placed close to *O. bilobus* Fab."

The above is a translation of the original description.

Olenecamptus albidus albidus Jordan (Pl. XI, fig. 3.)

1894. *Olenecamptus albidus* Jordan, Nov. Zool., 1, p. 232. Breuning, Nov. Ent. suppl. 3, 1, 1940, p. 553, fig. 562.

Distinct at once from all other African species by the broad, white, discal area of elytra, which covers the greater part of the

disk; the pronotum, too, is broadly white tomentose on the disk. Both these white areas are irregularly incised, in a manner varying among the different subspecies.

Female. Elongate-oblong, slender, cylindrical; reddish-brown, tawny pubescent, with dense, white tomentose markings as follows: head above with a large macula, covering most of the vertex; a broad vitta behind lower lobe of eye; front and genae less densely white. Pronotal disk nearly entirely white, except sides and a small, rounded macula each side, and a slightly larger, ovate macula medially at base. Scutellum maculate. Elytra with a broad, common area from base to apical sixth, incised narrowly at base and at basal quarter, a broad incision behind middle reaching rather close to suture, with its margins converging mesad, the apex of white area slightly prolonged; behind this each elytron with a small, white macula. Body beneath with sternum and first four abdominal segments broadly infuscate, hoary-gray pubescent, prosternum white vittate laterally, and side-pieces of meso- and metasternum white maculate, as is the metasternum each side; abdominal sternites 1–4 whitish bimaculate each side. Antennae and legs reddish-brown, sparsely tawny-gray pubescent.

Head finely alutaceous; antennal tubercles robust, with a short, broad tooth at apex; eye with lower lobe large, strongly widened posteriorly. Pronotum a little longer than wide; apical and basal sulcus deep, rather narrow, straight; disk smooth, not transversely carinate or rugose. Scutellum broadly rounded. Elytra with sides slightly widened behind middle, thence rounded to apices, which are shortly obliquely truncate at suture, with a short tooth at apex which points slightly laterad; disk with coarse, moderately spaced punctures which become a little finer apically. Mesosternal process feebly elevated medially, apical margin of process emarginate. Fifth sternite as long as third and fourth together, apex feebly emarginate. Antennae with seventh segment attaining elytral apex; scape reaching beyond middle of head, strongly asperate; third segment three times as long as first, feebly asperate at base; fourth much shorter, rest subequal.

(Males in the various subspecies differ from the females in having the pronotum a little more elongate, the elytra parallel-sided, the forelegs armed beneath, the antennae serrate beneath to ninth segment, and the fifth sternite slightly longer than fourth, rounded at apex.)

Length 14 mm.; width 3.2 mm.

Type locality: Kuilu, Belgian Congo.

Distribution.—Belgian Congo.

BELGIAN CONGO: ♀; Lulua, Katanga, Oct. 1932; (F. G. Overlaet); [MCB].

Olenecamptus albidus natalensis new subspecies (Pl. XI, fig. 6.)

Differs from the nymotype* as follows: pronotum with white area less

* The authors use the word "nymotype" throughout this paper interchangeably with "typical form" of a species.

broad, the lateral brown maculae connected with lateral brown portion to form irregular incisions and medially an apical macula as well as basal one. Scutellum with white macula smaller. Elytra with the basal incision much broader, extending well behind scutellum, the one at basal quarter rounder towards suture, somewhat narrowed laterally, the white area narrowed behind middle, then broadly incised, the posterior margin of this incision extending cephalad; the apical tooth nearly wanting. Body beneath more densely pubescent; sternites 1 to 4 laterally broadly white maculate, each macula enclosing a small brown spot.

Length 9.5–15 mm.; width 2.5–3.7 mm.

Holotype.—Female; Durham, Natal, Sept. 1900 [BMNH].

Allotype.—Male; Isipingo, Natal [BMNH].

Olenecamptus albidus interruptus Aurivillius (Pl. XI, fig. 4.)

1914. *Olenecamptus albidus* var. *interruptus* Aurivillius, Ark. Zool., IX, (8), p. 10. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 554.

From the nymotypic and the other subspecies, this differs in having the front sparsely white pubescent; the lateral, basal, and apical indentations of the pronotal median vitta much enlarged, the basal and apical ones elongate, so as to make it appear nearly bivittate. On the common elytral vitta the indentation behind the middle is so broad as to nearly separate the apical portion, which appears as three, coalescent, rounded, connected maculae (the center one common to both elytra and set slightly more apically). Metasternum and mesosternal side-pieces densely white pubescent; the sternites also with distinct white pubescence laterally.

Length 10–14.5 mm.; width 2.3–3.25 mm.

Type locality: Lukuledi, German East Africa.

Distribution.—Tanganyika.

TANGANYIKA: 2♂; Lukuledi, [RNS].

Olenecamptus albidus leonensis new subspecies (Pl. XI, fig. 5.)

Very distinct from the other races in having the pronotal white area with only a narrow brown macula medially behind middle, the sides without maculae or incisions. The elytra have the inicisions very fine, the apical macula nearly connected to the rest of the white and enlarged, so that, without magnification, the elytra appear to have a long, continuous, white discal area, with three narrow incisions each side.

Length 10–15 mm.; width 2.7–3.4 mm.

Holotype.—Female; Moyamba, Sierra Leone (D. Cator) [BMNH].

Allotype.—Male; Harbel, Liberia (W. M. Mann) [USNM].

Olenecamptus hofmanni hofmanni Quedenfeldt (Pl. XII, fig. 4.)

1882. *Olenecamptus Hofmanni* Quedenfeldt, Berliner Ent. Zeit., XXVI, p. 355, pl. 6, fig. 10. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 550, fig. 555.

The distinct white pubescence of the elytra, interrupted by dark annulated, denser white maculae, distinguished this species from others which have a common postscutellar elytral macula.

Male. Elongate-oblong, rather slender, cylindrical; piceous, with dense white pubescent markings as follows: head above with four narrow vittae, one either side of middle, converging just before vertex, a second of same width behind isthmus, behind lower lobe of eye a large, more or less triangular macula; front nearly entirely white. Pronotum darker brown pubescent, with a narrow, median, thinly white pubescent vitta, two large, densely white maculae each side, and a narrow, thinly white pubescent vitta over the procoxae. Scutellum on apical half white. Elytra white pubescent, with a large, common, more or less triangular macula at base which divides at its base and surrounds the scutellum, then each with three more maculae on disk, one just before middle, roughly triangular, one behind middle, more or less broadly elliptical and slightly oblique, the third at apex and somewhat ovoid; beneath humerus a short, linear macula; all of the elytral maculae have a broad margin of darker brown pubescence. Beneath piceous, rather densely white pubescent, laterally the white pubescence much denser; the sternites each with a somewhat elongate, oblique, dark brown macula laterally. Legs and antennae piceous, the former moderately grayish-white pubescent, the latter very thinly so.

Head above minutely alutaceous; front sparsely asperate; eye with lower lobe feebly widened posteriorly; antennal tubercles subapproximate basally, at apex with a short, robust tooth. Pronotum distinctly elongate, feebly wider apically than at base; basal and apical sulci wide, strongly curved medially; disk with a broad tumescence either side of middle behind apical sulcus; disk rather feebly transversely rugose medially. Scutellum transverse, sides feebly arcuate; apex broadly rounded. Elytra gradually attenuate to apices, which are suturally obliquely but feebly truncate, the outer angle having a short, subacute tooth; disk with large, deep, well-spaced punctures, which become slightly finer towards apex. Mesosternal process feebly elevated medially, apical margin subtruncate. Fifth sternite at apex subtruncate. Antennae more than twice length of body; scape attaining basal third of head, coarsely moderately asperate dorsally, third segment over three times length of scape; fifth slightly longer than fourth, remaining segments gradually shorter, except eleventh, which is distinctly longer than tenth; third and fourth segments rather feebly asperate dorsally, beneath very feebly serrate from third to ninth. Protibiae ventrally very strongly serrate.

Female. More robust, antennae about one and one-half times body length;

elytra feebly widened behind middle; fifth sternite at apex feebly, broadly emarginate; protibiae and antennae not serrate beneath.

Length 18–19 mm.; width 4.2–4.5 mm.

Type locality: Angola, Africa.

Distribution.—Central and western tropical Africa.

Belgian Congo: ♂; Sandkuru, Kondue; (Ed. Luja) [MCB]. ♀; Kasai, Kondue; (Leohard) [MCB]. ♀; Kondue; (Ed. Luja) [MRHNB].

Olenecamptus hofmanni elegans Aurivillius (Pl. XII, fig. 6.)

1914. *Olenecamptus elegans* Aurivillius, Ark. Zool., viii, (29), p. 26.
1940. *Olenecamptus hofmanni* ab. *elegans* Aurivillius. Breuning, Nov. Ent., suppl. 3, i, p. 550.

Very close to the nymotypic form but the maculae of the elytra are much larger and the dark margins narrower and glabrous; the maculae are yellowish-white instead of pure white.

Length 20 mm.; width 5 mm.

Type locality: Mlanje Bay, Nyassaland.

Distribution.—Southeastern tropical Africa.

German East Africa: ♀; vicinity of Ruaha River, December 18–21, 1910 (S. A. Neave) [BMNH].

Olenecamptus hofmani dimbokro new subspecies (Pl. XII, fig. 5.)

Elytral maculae more rounded than in *hofmanni elegans* but about same size as nymotypic form; common basal macula with the apex extended along suture for entire basal third.

Holotype.—Male; Dimbokro, Cote d'Ivoire [MRHNB].

Paratype.—Male; topotypic [MRHNB].

Olenecamptus macari Lameere (Pl. XII, fig. 3.)

1892. *Olenecamptus Macari* Lameere, An. Soc. Ent. Belg., xxxvi, p. 507. Breuning, Nov. Ent., suppl. 3, i, 1940, p. 553, fig. 561.

Close to *O. hofmanni* but the dark borders of the elytral maculae are pubescent, not glabrous; general body pubescence above orange-tawny, not white; pronotum dark brown pubescent; elytral maculae not nearly equal in size; eye with lower lobe larger, strongly widened posteriorly; tip of elytra more strongly, obliquely truncate at suture; and fifth sternite at apex not deeply emarginate.

Female. Elongate-oblong, rather slender, cylindrical; dark reddish-brown; above covered with dense orange-tawny pubescence and with chalky white markings as follows: head above with a broad vitta medially which is bifur-

cate posteriorly, behind eye with a vitta which is strongly constricted at middle; front orange-tawny pubescent, with white intermixed. Pronotum dark brown pubescent, either side of middle with two, more or less rounded maculae and laterally above procoxae with a vitta. Scutellum entirely white. Elytra at base with a more or less triangular common macula, each elytron with three large maculae, the largest just before middle, the second smaller, at apical third, and third smallest, at apex, between the second and third maculae a small, rounded spot on suture, common to both elytra; below humeri an elongate macula, constricted medially on upper margin; all maculae bordered by a dark brown pubescence. Beneath medially thinly grayish-white pubescent, laterally densely chalky white pubescent, each sternite laterally with a dark brown, oblique macula, the longest on the first sternite, rest gradually shorter. Legs and antennae light reddish-brown; the femora thinly grayish pubescent, tibiae and tarsi thinly orange-tawny pubescent, as are the antennae.

Head above finely alutaceous; front moderately asperate; eye with lower lobe large, rather strongly widened posteriorly; antennal tubercles well separated, at apex with a strong, sub-acute tooth. Pronotum feebly transverse, wider apically than basally; apical and basal sulci wide, apical one broader; disk either side of middle with a moderately elevated tumescence behind apical sulcus, medially sparsely transversely rugose. Scutellum transverse, sides nearly straight, apex broadly rounded. Elytra slightly widened behind middle, then rounded to apex; apices at suture strongly, obliquely truncate, tip with a feeble tooth; disk at base coarsely punctate, punctures well-spaced, finer apically. Mesosternal process feebly elevated medially; apex emarginate. Fifth sternite shallowly, arcuately sulcate at apex; apex broadly, feebly emarginate. Antennae (from seventh missing) with middle of seventh segment reaching elytral apices; scape reaching to basal third of head; third segment not quite three times length of scape; remaining segments gradually shorter.

Male. Antennae over twice as long as body; serrate rather feebly from third segment to tenth; elytra gradually attenuate to apices; protibiae strongly serrate ventrally; fifth sternite broadly rounded on apical margin.

Length 17 mm.; width 4.5 mm.

Type locality: Upper Kassai River, Angola.

Distribution.—South-Central Africa.

UGANDA: ♀; Ft. Portal Rd., Mbarara, Southern Toro, 3,800–4,200 ft., Oct. 22–24, 1911; (S. A. Neave) [BMNH]. BELGIAN CONGO: ♀; Luebo; (D. W. Snyder) [USNM]. ♂; Sandkuru, Kondue (Ed. Luja) [MCB]. ♀; Djombo, October 25, 1912 (R. Mayne) [MCB]. ♂, ♀; Kondue (A. Heyne) [MRHNB].

Olenecamptus giraffa Breuning (Pl. XII, fig. 18.)

1937. *Cylindrepomus giraffa* Breuning, Festschr. E. Strand, IV, p. 224; Nov. Ent., suppl. 3, I, 1940, p. 540, fig. 530.

Related to *anogeissi* and *signaticollis* but at once distinguished by the form of the elytral maculation and by the pronotal vittae being entire.

Male. Elongate-ovate, slender, subcylindrical; fuscous, elytra and abdomen laterally somewhat paler; entirely covered with hoary-gray pubescence and marked with white tomentum as follows: front and sides of head entirely white, except for an inverted "V" below antennal tubercles on front; vertex with a vitta each side of middle, tapering and converging apically. Pronotum with a narrow, flexuous vitta each side of middle and another narrower one above coxae. Scutellum entirely white except at base. Elytra each with three vittae on basal quarter, interconnected at extreme base, one at suture, knobbed and curved behind scutellum, one at middle of disk and one at side of disk, the latter two connected apically by a zigzag band, followed by a short, obliquely transverse macula, on posterior two-thirds a broad vitta near suture and a narrow vitta on side of disk, joining apically, connected at middle and at apical quarter with a broad band, leaving nude areas, each of which enclose an irregular macula, below humerus a narrow vitta, connecting with the lateral discal one at basal quarter. Abdominal segments each with a rounded, denuded macula laterally, decreasing regularly in size apically.

Head minutely, densely punctulate; front not asperate; antennal tubercles slightly toothed at apex. Pronotum one-third longer than wide; sides constricted before middle and at base; apical and basal transverse sulci distinct, the latter deeper; disk with a number of coarse transverse carinae between the sulci. Elytra with sides narrowed to apices from middle; apices subacuminate, strongly dentate near suture; disk moderately finely, densely punctate, obsoletely so before apex. Mesosternal process broad, emarginate at apex; fifth sternite feebly longer than fourth, apex subtruncate. Forelegs elongate, protibiae dentate internally; profemora feebly rugose beneath. Antennae more than twice length of body, fifth segment attaining elytral apex, finely, sparsely serrate beneath; scape reaching behind middle of vertex, densely asperate above; third segment nearly five times as long as first, fourth much shorter, longer than fifth, both third and fourth sparsely asperate above.

Female. Pronotum only feebly longer than wide; elytra less tapering behind; protibiae and profemora simple; fifth sternite as long as third and fourth together, apex emarginate; antennae not serrate beneath and shorter; otherwise as in male.

Length 16–17 mm.; width 3.5–4 mm.

Type in Dehra Dun Museum.

Type locality: Bombay, Nagagalli and Belgoum, India.

Distribution.—British India.

India: ♀; Camara [BMNH]. ♂, ♀; Nilgiri Hills [BMNH].

Olenecamptus signaticollis signaticollis Heller (Pl. XII, fig. 17.)

1926. *Olenecamptus signaticollis* Heller, Tijd. Ent., LXIX, p. 39, pl. 5, fig. 6. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 544, fig. 537.

Distinct from all other known species by the irregularly interrupted vittae of the pronotum and the interconnecting, irregular-shaped maculae of the elytra.

Female. Elongate-oblong, slender, cylindrical; reddish-brown, elytra nearly testaceous, as are legs, antennae, and body beneath (the only specimen seen had been reared and possibly killed before the body coloration was fully developed); covered with rather coarse, fulvous pubescence, and with dense white tomentum arranged as follows: head on vertex with two broad vittae, poorly defined, extending indefinitely between eyes; sides with a narrow, bent vitta behind eyes; front and genae largely whitish pubescent. Pronotum with two broad vittae, one each side of middle, coalescent at base, each broadly interrupted by two glabrous spaces, one circular at apical third, open laterally, one elongate at base, slightly oblique. Scutellum largely white tomentose. Elytra each with six discal maculae, one elongate on base at suture, irregular, widened anteriorly, incised behind, one small behind humeri, another before middle at center of disk, oval, slightly oblique, the largest of all, sometimes connected with the next one which is at middle near suture, irregular in shape, fifth at center of disk on apical third, oval, and the last elongate, along suture nearly to apex, recurved laterally and anteriorly to form a hook; beneath humeri and along sides posteriorly with several patches of sparser tomentum. Body beneath entirely densely white tomentose; abdomen on each sternite with an ovate, glabrous macula laterally, progressively smaller from the first to last. Legs and antennae sparsely ashy pubescent.

Head with front not asperate, minutely, densely punctate; eye with lower margin oblique; antennal tubercles robust, prominent, slightly toothed at apex. Pronotum one-seventh longer than wide, sides constricted near base and apex, wider anteriorly than at base; disk with a number of transverse rugosities, more distinct on caudal half, basal and apical transverse sulci broad and deep. Scutellum transverse, sides strongly oblique, apex arcuate. Elytra feebly narrowed posteriorly, apices right angularly produced, with a minute tooth at tip; disk densely, rather coarsely punctate to apical third, thence finely so to apex. Mesosternal process broad, tapering posteriorly, apex feebly emarginate; fifth sternite as long as third and fourth together, apex slightly emarginate. Front legs elongate, profemora and protibiae without serration. Antennae nearly twice length of body, not serrate; scape reaching to middle of vertex, asperate above; third segment about four times as long as first, smooth; fourth much shorter, rest subequal; eleventh elongate and arcuate.

Length 15–17 mm.; width 3.4–3.8 mm.

Type locality: Nilambur, Madras.

Distribution.—Madras, India.

INDIA: 3♀; Nilambur, Madras; reared from *Lagerstroemia lanceolata*, May 6, 1924, Oct. 24, 1924 (C. F. C. Beeson) [USNM–2; BMNH–1].

Olenecamptus signaticollis sexplagiatus Breuning

1936. *Cylindrepomus sexplagiatus* Breuning, Festschr. E. Strand, 1, p. 318; Nov. Ent., suppl. 3, 1, 1940, p. 540, fig. 529.
1936. *Olenecamptus nicobaricus* Breuning, Festschr. E. Strand, 1, p. 320; Nov. Ent., suppl. 3, 1, 1940, p. 543, fig. 536, new synonymy.

From Breuning's figure and original description, this subspecies is distinct in having the pronotal vittae somewhat shorter, so that they do not overrun either of the transverse sulci and the elytra with their maculae differing thus: the postscutellar macula only as long at suture as broad, the posthumeral much reduced, the first discal quadrate and united with the median sutural, and at apex there is but a single (oblique) macula.

Types in British Museum.

Type localities: Andamans (*sexplagiatus*); Nicobar Isl. (*nicobaricus*).

In determining the generic position of this form for the authors, Dr. H. E. Hinton compared the types of *sexplagiatus* and *nicobaricus* and discovered their identity; hence he should be credited with the above synonymy.

Olenecamptus anogeissi Gardner (Pl. XIII, fig. 1.)

1930. *Olenecamptus anogeissi* Gardner, Ind. For. Rec., XIV, (7), p. 156, pl. 1, fig. 3. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 544, fig. 538.

In many respects intermediate between *signaticollis* and *compressipes*, but not very closely related to either. The maculation of the elytra is most similar to the former; from that species it may easily be distinguished by its slender form and by the pronotal vitta being slender, tapering, extending from apex to near basal quarter.

Male. Elongate-ovate, slender, subcylindrical; entirely reddish-brown, elytra, tibiae, and tarsi more yellowish-brown; sparsely covered with cinereous pubescence and with white or whitish markings as follows: front rather sparsely white above mouth; vertex each side with an elongate, triangular macula, their inner margins parallel, extending between eyes. Pronotum each side of disk with a narrow vitta, tapering posteriorly, extending from apical margin to near basal quarter. Elytra with five or six large maculae, one at base, irregular, extending from scutellum obliquely to side of disk at basal sixth, followed closely by a very small one laterally with which it is

often joined, on middle third of disk two maculae, often connected, one before middle placed near center of disk, the other behind middle close to suture and usually prolonged along suture and joining the second of three elongate linear maculae placed irregularly one behind the other; occasionally these last three are reduced to small ovate spots. Undersurface and legs more heavily pubescent than upper, with scattered glabrous punctures; abdominal sternites each with a very indistinct dark macula on sides. Antennae pale reddish-brown, apical segments gradually paler, apices of segments from third briefly dark brown.

Head sparsely punctate; front finely, sparsely asperate; antennal tubercles robust, slightly prominent, with a long, acute tooth at apex. Pronotum one-third longer than wide, sides irregular, apex slightly wider than base; apical sulcus broad, basal one deep; disk densely, coarsely rugose transversely. Scutellum nearly semicircular. Elytra parallel-sided, rounded from apical third; apices obliquely, emarginately truncate, external angle with a feeble tooth; disk rather densely punctate throughout, punctures coarse, finer just before apex. Mesosternal process tapering posteriorly, apex notched; fifth sternite longer than fourth, apex broadly emarginate. Front legs elongate; profemora rugose beneath; protibiae distinctly spinulose on lower surface. Antennae more than twice as long as body, fifth segment nearly attaining elytral apex, finely densely serrate from third to eleventh segments; scape reaching beyond middle of vertex, densely asperate above; third segment four times as long as first, asperate above, fourth much shorter, asperate above on basal half, rest subequal.

Female. As male but pronotum only slightly longer than wide; elytra widened posteriorly; fifth sternite twice length of fourth, apex narrowly emarginate; antennae about one-half longer than body, not serrate, third segment asperate only near base, fourth smooth; protibiae and profemora unarmed.

Length 14–16 mm.; width 3.5 mm.

Type locality: Bilaspur, (Central Prov.) India.

Distribution.—British India.

INDIA: 2♂; Nowatoli, Chota Nagpore. ♂; Bombay. 3♀; Choral, doing great damage to *Anogeissus latifolia,* Nov. 25, 1910. [All BMNH.] ♀; Sappal, Palghat, Madras, 1700 ft., May 15, 1930 (J. C. M. Gardner) [USNM].

Olenecamptus indicus Breuning (Pl. XII, fig. 16.)

1936. *Cylindrepomus indicus* Breuning, Festschr. E. Strand, 1, p. 317; Nov. Ent., suppl. 3, 1, 1940, p. 539, fig. 527.

Indicus is very close to *anogeissi,* but is at once distinguished by the lack of the common postscutellar macula on elytra; and the common, median macula is transverse, not V-shaped.

Female. Elongate-oblong, rather slender, cylindrical; head and pronotum piceous or darker reddish-brown; elytra reddish-brown, covered with silvery-gray pubescence which is denser on elytra. Head with front densely white pubescent, and above with a white vitta either side of middle which converges on vertex. Pronotum with four dense, white vittae, two dorsally (which continue those on head) and one each side above procoxae. Scutellum densely white pubescent. Elytra just before middle each with a small, dense, white, quadrate macula which joins with a narrow band at suture and from this band near suture a short, white vitta which does not attain the scutellum; on apical quarter each with a transverse, more or less rectangular macula which connects to a rather irregular, elongate macula at apex; below humerus a short white vitta which attains basal third. Beneath reddish-brown, moderately clothed with yellowish-gray pubescence; sternites 1 to 4 each with a small, dark macula laterally. Legs and antennae reddish-brown, silvery-gray pubescent.

Head above alutaceous; eye with lower lobe transverse, strongly widened posteriorly; antennal tubercles prominent, well-separated with a short, robust tooth at apex. Pronotum slightly elongate; distinctly wider apically than at base; basal sulcus deep and moderately wide, apical one shallow, wide, and slightly arcuate medially; disk medially with a few transverse rugosities. Scutellum transverse, sides and apex broadly arcuate. Elytra gradually attenuate to apices, which are narrowly rounded at tip and bear a robust tooth; surface with coarse, well-spaced punctures. Mesosternal process short, slightly narrowed apically; deeply bilobedly emarginate at apex forming two sharp processes. Antennae one and one-half to one and two-thirds times body length; scape equal to two-thirds length of head, coarsely, strongly asperate on dorsal surface; third segment three and one-half times scape; remaining segments gradually shorter, except eleventh which is distinctly longer than tenth.

Length 11–14.5 mm.; width 2.3–3 mm.

Type in Naturhistorische Riksmuseum, Stockholm.

Type locality: Chandkhiva, Sylhet.

Distribution.—Northern India.

INDIA: 3♀; Chandkhiva, Sylhet, India (J. L. Sherwill) [ANSP-2; RNS —Holotype♀].

Olenecamptus circulifer Heller

1923. *Olenecamptus circulifer* Heller, Tijd. Ent., LXVI, p. 37, pl. 1, fig. 3.
1940. *Olenecamptus affinis* m. *circulifer* Heller. Breuning, Nov. Ent., suppl. 3, I, p. 550, fig. 553.

"Chestnut, white tomentose, head between upper ocular lobes with a fascia, another postocular, and laterally and a vitta on vertex, fuscous; prothorax fuscous, above four plagae and each side a supracoxal vitta, chalky-scaled; elytra crebrosely and strongly punctate, apices separately acuminate, with

four fuscous, denuded, subrotund annuli, two posterior ones connected, tangent to suture. Length 17 mm.; width 4 mm. Mindanao: Dapitan.

"Easily recognized by the markings; elytra strongly punctate to apex and at apex each produced into a point. Transverse rugae on thorax are fine, but distinct, at middle of disk a fifth, longitudinal, light macula is indicated. Underside is unicolorous, whitish tomentose."

Remarks.—The foregoing is a translation of Heller's original description.

It is interesting to note in connection with the bibliography above that *affinis* Breuning was first described in 1936.

Olenecamptus diversemaculatus Breuning

1937. *Olenecamptus diversemaculatus* Breuning, Festschr. E. Strand, IV, p. 225; Nov. Ent., suppl. 3, I, 1940, p. 550, fig. 554.

"Near to *optatus* Pasc., but: Pronotum in male much longer than broad, in female somewhat broader than long, disk more coarsely rugose; elytra apically more strongly truncate, the lateral angle produced in a short spine; legs longer. Red-brown, entire upper surface yellow tomentose, each side of pronotal disk a rather sharply impressed, narrow, white vitta; the four white elytral maculae irregularly formed, transverse, and dentate, irregularly. Undersurface, legs, and antennae finely yellow-gray tomentose, metasternum and abdomen densely white tomentose. Length 14–18 mm., width 3½–4 mm. Type ♂ from Siam: Chiengmai in British Museum." (Translation of the original description.)

Remarks.—Close to *O. indicus* Breuning but the maculae in the illustration appear to be much larger than in that species and more irregular in outline.

Olenecamptus vittaticollis Heller (Pl. XI, fig. 16.)

1923. *Olenecamptus optatus vittaticollis* Heller, Tijd. Ent., LXVI, p. 38, pl. 1, fig. 2.

1940. *Olenecamptus affinis* m. *vittaticollis* Heller. Breuning, Nov. Ent., suppl. 3, I, p. 550.

Distinct from *optatus* and *affinis* in having the prothorax distinctly longer than wide in females, more than half again as long as wide in male, the disk with a white vitta each side; the maculae on vertex coalescent anteriorly; the elytra with a small macula below humeri; metasternum and abdomen densely white tomentose; protibiae subspinose and mesotibiae dentate in male.

Male. Elongate-oblong, slender, cylindrical; nearly fuscous, covered with ashy pubescence and with white tomentose markings as follows: head with

elongate maculae on vertex, converging anteriorly, where they coalesce, an irregular vitta behind each eye; front transversely maculate. Pronotum with a broad, irregular vitta each side of disk reaching from basal to apical margins, a narrow one just above procoxae. Elytra with four, very large, narrowly separated maculae on disk, the last two usually coalescent, and a small, ovate macula below humeri. Body beneath dark reddish-brown, ashy pubescent; metasternum and its sidepieces and the abdomen uniformly densely white tomentose, mesepisterna maculate with white; abdomen with a dark macula on sides of each sternite, that on first largest, rest successively smaller. Legs fuscous, ashy pubescent. Antennae fuscous, gradually and very feebly lighter distally, sparsely hoary pubescent.

Head with front sparsely asperate; eye with lower lobe slightly widened posteriorly; antennal tubercles robust, slightly prominent, at apex with a short, broad tooth. Pronotum one-half longer than wide, sides constricted before middle and near base; apical and basal transverse sulci broad; with a number of fine, transverse rugosities, often covering entire disk. Scutellum transverse, apex truncate. Elytra slightly tapering posteriorly, apices separately, subacuminately rounded, at extreme tip a short, acute spine; disk moderately densely punctate. Prosternal process narrow; mesosternum with a feeble elevation medially, apex truncate; fifth sternite slightly longer than fourth, its apex subtruncate. Antennae more than twice length of body, fifth segment surpassing elytral apex; scape reaching behind middle of vertex, third segment four and one-half times as long as first, fourth much shorter; first four segments densely asperate above, third to eighth segments serrate beneath. Profemora finely serrate beneath and posteriorly; protibiae densely, coarsely spinulose beneath, mesotibiae sparsely, finely so.

Female. Pronotum one-fifth longer than wide; antennae and legs less elongate, unarmed, the former about twice length of body; fifth sternite twice length of fourth, apex emarginate.

Length 14–26 mm.; width 3.5–5.5 mm.

Type locality: Mt. Makiling, Luzon.

Distribution.—Philippine Islands (confined to Luzon?).

PHILIPPINE ISLANDS: 3♂, 3♀; Mt. Makiling, Luzon (Baker) [USNM]. ♀; Manila, Luzon [BMNH].

Remarks.—The authors find it difficult to justify Breuning's form of this name, his *affinis* having been described thirteen years (1936) after Heller's appeared in print.

Olenecamptus quadriplagiatus new species (Pl. XI, fig. 15.)

Olenecamptus quadriplagiatus Boppe, Ms.

Very close to *O. vittaticollis* Heller, but the white vittae either side of middle on head are parallel rather than converging, and more widely separated; there is also a very narrow median vitta

which is shortly bifurcate on occiput and narrowed on vertex; scutellum narrowly white vittate medially; of the elytral maculae the anterior and posterior margins are irregular and the third and fourth are not coalesced; elytral tips very feebly, obtusely toothed rather than strongly dentate.

Male. Elongate oval, rather slender, cylindrical; reddish-brown, pale brownish-gray pubescent, maculate and vittate as follows: head with five white vittae, one narrow medially, shortly bifurcate on occiput and narrowed on vertex, either side of this is a narrow, dark brown vitta which does not attain base but is abbreviated by the bifurcation of the median vitta, just behind upper ocular lobe a wide, white vitta which narrows apically, and behind lower lobe a white vitta which narrows very abruptly and does not attain base of head; front margined narrowly with white. Pronotum with four white vittae, one broad, either side of middle which is narrowly constricted near its middle and a narrow one over procoxae. Scutellum with a narrow, white vitta medially, somewhat widened basally. Elytra each with four, large, white maculae set in a longitudinal row on a broad, brown vitta, basal one broadest at base, elongate, much narrowed apically, the lateral margin rounded to middle, then sharply incised, the second more or less rectangular but with the lateral side elongated anteriorly and posteriorly, fitting into the space left vacant by the narrowing basal macula and by the third macula; the third macula nearly quadrate but the sutural anterior angle prolonged, fitting into the short side of preceding macula, the fourth one very elongate, narrowly oval, the apex acute; beneath humeri a small, elongate, white macula. Beneath piceous, thinly pale gray pubescent, a narrow, white vitta anterior to mesocoxae, mesosternal sidepieces, metepisterna, and metasternum white laterally; abdomen broadly white vittate laterally, with an elongate, dark macula on each sternite, largest on first sternite, smaller on succeeding ones. Legs dark reddish-brown, thinly pale gray pubescent. Antennae with scape and base of third segment dark reddish-brown, remainder paler, with extreme apices dark; scape densely, other segments thinly, pale gray pubescent.

Head above minutely alutaceous, as is the front, which also is sparsely asperate; eye with lower lobe only slightly wider posteriorly; antennal tubercles subapproximate basally, with a short, robust tooth at apex. Pronotum elongate, base and apex subequal, widest near basal sulcus, basal and apical sulci nearly straight, apical somewhat wider; disk regularly, moderately, transversely rugose. Scutellum transverse, sides straight, oblique, apex simply arcuate. Elytra tapering to apices, which are very shortly, obliquely truncate at suture and with an obtuse dentation at tip; disk coarsely punctate to behind middle, thence somewhat more finely so to apex. Mesosternum feebly elevated medially between coxae, apex of process emarginate; fifth sternite narrowed apically, emarginate feebly at tip. Legs with profemora feebly, protibiae strongly, serrate beneath; protarsi very heavily fringed. Antennae about two and one-half times body length; scape reaching to be-

yond middle of head, moderately asperate; third segment nearly four times length of first, third and fourth asperate dorsally, from third through ninth serrate ventrally.

Length 18–20 mm.; width 4–4.3 mm.

Holotype.—Male; "Dai (Dri) Dry, L.D., 6–13" [MRHNB].

Paratype.—Male; Lao Kay, Tonkin, May 17, 1912 (R. Vitalis de Salvaza) [MRHNB].

Olenecamptus affinis Breuning (Pl. XI, fig. 17.)

1936. *Olenecamptus affinis* Breuning, Festschr. E. Strand, 1, p. 319; Nov. Ent., suppl. 3, 1, 1940, p. 550.

Distinct from *O. optatus* in having the maculae of vertex diverging anteriorly; the elytra with a subhumeral vitta; pro- and mesosternum densely white pubescent, rest of undersurface densely white tomentose, except medially, where it is tawny-variegated.

Male. Elongate-oblong, rather slender, cylindrical; dark reddish-brown, covered with gray or tawny pubescence, with white tomentose markings as follows: head with a large, triangular macula each side of vertex, diverging anteriorly; on sides a short vitta; front below and eyes margined with white. Prothorax with two moderately small maculae each side of middle, the anterior one oblong, with a posterior lateral prolongation, the hind one more or less ovate. Elytra each with four maculae in a row on disk, the basal one large, slightly elongate, irregular in shape, the second much larger, more or less oblong, posterior margin oblique, extending behind middle, the third at apical quarter, oblique, smaller than first, and fourth elongate, not oblique, well before apex, smallest of all; below humeri a vitta extending to basal quarter. Body beneath and legs dark reddish-brown, covered with white pubescence, variegated with fulvous at middle on metasternum and abdomen, and displaced laterally with dense, white tomentum on body from behind procoxae to abdominal apex; metepisternum and abdominal sternites laterally maculate with blackish; abdomen, tarsi, and femora apically, piceous. Antennae dark reddish-brown; scape fuscous or piceous, finely gray pubescent.

Structures exactly as in *O. optatus,* the forelegs rather more strongly armed than any of its forms.

Length 22–24 mm.; width 4.3–4.5 mm.

Type in British Museum.

Type locality: Sarawak.

Distribution.—Confined to the island of Borneo.

Borneo: ♂; Sanga Sanga, Moorjawa; (H. D. Jensen) [BMNH]. ♂, no locality data [MCZ]. ♂; Sandacan; (Baker); [USNM]. Sarawak: ♂; no further locality data [BMNH].

Olenecamptus siamensis siamensis Breuning (Pl. XI, fig. 12.)

1936. *Olenecamptus siamensis* Breuning, Festschr. E. Strand, 1, p. 319; Nov. Ent., suppl. 3, 1, 1940, p. 549, fig. 552.

Similar to *optatus* in the arrangement and number of the tomentose maculae on the upper surface. Distinct from that species in having the scutellum white tomentose; the maculae on vertex divergent anteriorly; the basal macula of elytra irregular in outline, produced behind the scutellum towards the suture; the antennae shorter; the 6th (♂) or 8th (♀) segment attaining elytral apex; and elytral apex broadly toothed, not spined.

Male. Elongate-oblong, slender, cylindrical; dark reddish-brown, covered with light gray pubescence, and with white or pale yellow tomentose markings as follows: head above with a broad, triangular macula each side of middle, divergent anteriorly, behind eye a short, broadish vitta; eye irregularly outlined; front broadly margined below. Pronotum with three small maculae on each side of middle of disk, middle one minute, placed a little more laterad. Scutellum nearly entirely white tomentose. Elytra each with four maculae, first three subequal in size, apical one smallest, basal one irregular in outline, mesal side extending obliquely towards suture, second one before middle, third at apical third, fourth just before apex; beneath humeri a small macula. Body beneath dark reddish-brown to nearly fuscous, pro- and mesosternum gray pubescent, metasternum densely white tomentose; a fine white vitta on sides of prothorax; abdomen largely white pubescent, sides of first sternite broadly gray pubescent, second to fourth sternites each side with two series of gray maculae, fifth with one each side, usually the pairs on second enlarged and more or less coalescent. Legs and antennae reddish-brown, sparsely pale gray pubescent.

Head minutely alutaceous; front rather densely, finely asperate; eye with lower lobes strongly widened posteriorly, upper margin oblique, antennal tubercles robust, slightly prominent, at apex with a very short tooth. Pronotum one-fifth longer than wide, sides constricted before base and apex; basal and apical transverse sulci broad, deep; disk tumid, with a number of fine transverse rugosites. Scutellum transverse, nearly semicircular. Elytra very little widened behind middle, apices separately rounded, at tip a broad, slightly acute tooth; entire surface densely, rather finely punctate. Mesosternal process feebly elevated medially, truncate at apex. Antennae nearly twice length of body, sixth segment attaining elytral apex; scape reaching beyond middle of vertex, densely coarsely asperate above; third segment more than three times as long as first, feebly asperate above on basal half; fourth much shorter; third to ninth segments finely serrate beneath. Profemora finely serrate beneath; protibiae rather coarsely, densely spinulose beneath.

Female. More robust in body form; legs and antennae less elongate, unarmed, the eighth segment of the latter attaining elytral apex. Fifth sternite with a median line.

Length 17–22 mm.; width 4–5.5 mm.

Type in British Museum.

Type locality: Siam.

Distribution.—Siam and French Indo-China.

Siam: 5♀; no locality data [AMNH–1; BMNH–2; MCZ–1; MRHNB–1]. ♀; Bangkok (Hugh Smith) [USNM]. Malay Archipelago: 2♂, ♀; no locality data [ANSP–♀; CNHM–♂; RNS–♂]. French Indo-China: 2♂; Cochin China [CNHM]. ♂; Kompongkuley, Cambodia, April [MRHNB].

Olenecamptus siamensis reducta Breuning

1940. *O. siamensis* m. *reducta* Breuning, Nov. Ent., suppl. 3, I, p. 549.

"The elytral maculae white and are a great deal smaller; the third spot is completely lacking; body beneath without white spots." (Translation of the original description.)

Type locality: Sumatra, type in Museum at Hamburg.

Olenecamptus optatus optatus Pascoe (Pl. XI, fig. 13.)

1866. *Olenecamptus optatus* Pascoe, Proc. Zool. Soc. Lond., p. 253; Trans. Ent. Soc. Lond., (3), III, 1866, p. 317. Waterhouse, Aid Ident. Ins., 1886, pl. 175, fig. 3. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 549, fig. 550.

The distinguishing characteristics of this species are: elytra with four white maculae arranged in a row from base to apex, without a subhumeral vitta or macula, the apex dentate; the pronotum with two white maculae on each side of disk; head with a white macula each side of vertex, converging anteriorly; body beneath, except prothorax, white pubescent (not tomentose) darker medially and with dark maculae laterally; the scutellum not white tomentose; and the prothorax one-fifth longer than wide in male, subquadrate in female.

Male. Elongate-oblong, slender, cylindrical; dark reddish-brown, sparsely clothed with pale ashy-gray pubescence, glabrous around the white tomentose markings which are as follows: head above with a pair of elongate, triangular maculae, placed one each side of middle, converging anteriorly but not contiguous. Pronotum with four maculae, two each side of middle, the anterior ones slightly larger, transverse, with a posterior prolongation laterally, the hind ones obliquely ovate. Elytra each with four maculae, an irregular one

at extreme base, the second a little before middle, ovate, subequal in size to basal one, and the third smaller at apical third, the fourth still smaller, ovate, just before apex. Front below and eye outlined with denser ashy-gray. Body beneath dark reddish-brown, hoary pubescent (not tomentose) especially laterally, but not on pro- or mesosternum, a line of hoary each side of prothorax above coxal cavities; mesepisterna, metasternum laterally, and metepisterna black maculate; abdomen densely hoary, with a blackish macula on sides of each sternite, that on first sternite largest, rest gradually smaller. Legs reddish-brown, ashy-gray pubescent; tibiae and tarsi paler. Antennae reddish-brown, paler from middle of third segment; scape ashy pubescent.

Head minutely alutaceous; front moderately asperate; eye with lower lobe strongly widened posteriorly, upper margin oblique; antennal tubercles robust, slightly prominent, at apex with a short robust tooth. Pronotum one-fifth longer than wide, sides constricted feebly at base, apex, and middle; basal and apical transverse sulci deep; disk with a number of fine transverse rugosities. Scutellum transverse, nearly semi-circular. Elytra very little widened behind middle, apices acuminately rounded, at tip (not at suture) a short, acute spine; entire disk regularly, finely, densely punctate, at base punctures coarser. Prosternal process moderately narrow; mesosternum with a broad, longitudinal elevation medially, apex truncate; fifth sternite slightly longer than fourth, apex feebly emarginate. Protibiae finely dentate internally; profemora minutely serrate beneath. Antennae nearly twice length of body, fifth segment nearly attaining elytral apex; scape reaching to middle of vertex, densely, coarsely asperate above; third segment three and one-half times as long as first, coarsely asperate; fourth much shorter, serrate on inner edge as are fifth to eighth; eleventh longer than tenth.

Female. As male but more robust; pronotum subquadrate; elytra wider posteriorly; profemora and protibiae simple beneath; fifth sternite broader, less tapering, with a median impressed line; and antennae less elongate.

Length 13–14 mm.; width 3–3.5 mm.

Type locality: Singapore.

Distribution.—Malay peninsula.

SIAM: ♀; Jering, Jambu [BMNH]. MALAY STATES: ♂; Penang [BMNH].

Olenecamptus optatus optatoides new subspecies (Pl. XI, fig. 14.)

1866. *Olenecamptus optatus* Pascoe, Proc. Zool. Soc. Lond., p. 253 [ex parte]. Lacordaire, Gen. Col., IX, 1872, pl. 101, fig. 4.

Male. Distinct from the nymotype in the following respects: size larger; head with the vertical maculae larger; anterior maculae of pronotum, slightly elongate; elytra with premedian macula oblong, distinctly longer than basal one, postmedian macula also oblong, metepisterna broadly brown vittate below; tibiae slightly paler than tarsi or femora, protibiae strongly dentate within.

Length 20 mm.; width 4.6 mm.

Holotype.—♂; Sandakan, Brit. N. Borneo; (W. B. Pryer) [BMNH].

Allotype.—♀; Lintang [RNS].

Paratypes.—2 males; Borneo [RNS; MRHNB]. Female; Kapoero, Bov., Borneo [RNHL]. Male; Medan, Sumatra (L. Fulmek) [USNM]. Female; Bandar, Baroe, Sumatra [RNS]. 2 males; Tandjong, Morawa, Serdang, Sumatra [RNHL]. Female; D. B. Sumatra [RNHL]. 2 males; Isl. of Karimon, 1895 (A. L. Van Hassett) [RNHL]. Female; Pontianak, Borneo [MRHNB].

Olenecamptus octopustulatus octopustulatus Motschulsky
(Pl. XI, fig. 9.)

1860. *Ibidimorphum octopustulatum* Motschulsky, Schrenk's Reisen in Amur Land, II, p. 152, pl. 10, fig. 3. Blessig, Horae Soc. Ent. Ross., IX, 1872, p. 194. Ganglbauer, Bestimm. Tab., VIII, 1884, p. 87 (521).

1911. *Olenecamptus octopustulatus* Motschulsky. Jakobs, Käf. Russland, IX, pl. 71, fig. 6. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 548, fig. 547.

Distinct from the other members of this group in the slender form and the black under side of the body.

Male. Elongate-ovate, slender, cylindrical; fusco-testaceous, covered with fine, fulvous pubescence. Head (rubbed) with vertex between upper lobes of eyes white. Pronotum with four, small, white maculae, two either side, more lateral, one just behind apical sulcus, the other just before the basal one, a narrow, white vitta above procoxae. Elytra each with four, small, white maculae, first basal, broadly oval; the second just before middle, slightly larger than basal but similarly shaped; third at apical two-thirds, same size and shape as preceding; fourth at apex smallest and more or less oval in shape. Beneath black or piceous, finely pale gray pubescent, mesosternal sidepieces and metasternum laterally white pubescent.

Head above finely alutaceous; front finely rugose; eyes with lower lobe strongly widened posteriorly; antennal tubercles widely separated, at apex with short, robust tooth. Pronotum elongate, base and apex subequal in width, widest just before basal sulcus; disk finely carinulate; apical sulcus broad, shallow, nearly straight, basal one narrow, deeper and angularly curved medially. Scutellum transverse, sides feebly arcuate, oblique, apex rounded. Elytra with sides feebly attenuate, apices feebly, obliquely truncate, feebly obtusely dentate at tip; disk to behind middle coarsely punctate, thence to apices somewhat finer. Mesosternum medially tumid basally, apex of process angularly emarginate. Fifth sternite feebly tapering apically, apex subtruncate. Profemora feebly, protibiae strongly, serrate beneath. Antennae at least two and one-half times body length, scape reaching to behind

middle of head, sparsely, moderately asperate; third segment nearly four and one-half times length of first, and asperate on basal two-thirds dorsally; from third through seventh serrate ventrally.

Length 9 mm.; width 1.75 mm.

Type locality: Amur, Siberia.

Distribution.—Siberia.

SIBERIA: ♂; Vladivostok [MRHNB].

Olenecamptus octopustulatus chinensis new subspecies

From the subspecific form *O. o. formosanus* Pic, it is distinguished by having the second macula of elytra distinctly oval in shape (posterior end widest) and much larger than the third; the fourth is also smaller in proportion to the third.

Length 10–11.5 mm.; width 2.3–2.5 mm.

Holotype.—Male; Shanghai, 1918; (R. Höhne) [CNHM].

Allotype.—Female; Tsche-Kiang, China [RNS].

Olenecamptus octopustulatus decemmaculatus Pic (Pl. XI, fig. 10.)

1916. *Olenecamptus decemmaculatus* Pic, Mat. Étud. Longicorn, x, p. 13.
1940. *Olenecamptus formosanus* ab. *decemmaculatus* Pic. Breuning, Nov. Ent., suppl. 3, 1, p. 548.

Close to the nymotypic form but the maculae on the elytra are much larger and are rounded, instead of oval, and the distance between the second and third maculae is much shorter.

Length 9 mm.; width 2.9 mm.

Type locality: Hanoi, Tonkin.

Distribution.—Tonkin.

FRENCH INDO-CHINA: ♀; Rivère Claire, Madon, Upper Tonkin [MRHNB].

Pic described his type as having the base of elytra white, each with four additional maculae; but such is not the case with the above described specimen.

Olenecamptus octopustulatus formosanus Pic (Pl. XI, fig. 11.)

1914. *Olenecamptus formosanus* Pic, Mat. Étud. Longicornes, IX, p. 19. Schwarzer, Ent. Blätt., XXI, 1925, p. 63. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 548, fig. 548.
1933. ? *Olenecamptus octopustulatus* Motschulsky. Matsushita, Journ. Fac. Agr. Hokkaido, XXXIV, p. 352.

Distinguished from the nymotypic form in having all maculae on elytra much larger in proportion, and the third and fourth more

or less squarish in outline and subequal in size; sometimes two and three joined at suture; on undersurface the metasternum and the sides of the abdomen are white maculate.

Length 8.7–12.5 mm.; width 1.8–2.3 mm.

Type locality: Finan, Formosa.

Distribution.—Formosa.

FORMOSA: 3♂; Alikang; October 7 (H. Sauter) [USNM]. 4♂, 5♀; Kuraru, Apr.–June, Aug., (1932–1936) (L. Gressitt) [CAS]. 3♂, 5♀ [L. Lacey]; ♂, 2♀; Bukai, June 11–12, 1934 (L. Gressitt) [CAS]. ♂; Chipon; April 18, 1932 (L. Gressitt) [CAS]. 2♂; Rokki, May–June, 1932 (L. Gressitt) [CAS]. ♂; Urai, May 1, 1932 (L. Gressitt) [CAS]. ♂; with data in Japanese [CAS]. ♂; Kosempo, Apr. 25 [RNHL].

Olenecamptus fouqueti Pic (Pl. XI, fig. 18.)

1932. *Olenecamptus Fouqueti* Pic, Bull. Ent. Soc. France, XXXVII, p. 138.
1940. *Cylindrepomus fouqueti* Pic. Breuning, Nov. Ent., suppl. 3, I, p. 539, fig. 528.
1936. *Cylindrepomus laosensis* Breuning, Festschr. E. Strand, I, p. 317.

This species is conspicuously distinct from *optatus* and related species by the thorax being unimaculate each side of disk, not bimaculate or vittate. Each elytron, moreover, has three maculae additional to the usual four, namely two fine ones on the side of disk and a somewhat larger one behind middle near suture. On the body beneath, there is a broad, white tomentose vitta from eye to tip of abdomen.

Female. Elongate-oblong, slender, cylindrical; above, beneath, and all appendages dark reddish-brown, covered with light gray pubescence and with white tomentose markings as follows: head above with a triangular macula each side of middle, their mesal sides parallel, a small macula behind each eye, and eye margined above and below. Pronotum with an ovate macula at middle of each side of disk. Elytra each with three, subequal, ovate maculae in a row on disk, the basal ones convergent internally, the second oblique, before middle, and the third at apical quarter; on extreme side of disk two small maculae, one behind humerus, the other beyond middle, and near suture two larger ones, the first behind middle, the second subvittiform, at apex. Body beneath with a broad vitta from head to tip of abdomen on the abdominal sternites including irregular, small, glabrous maculae.

Head minutely alutaceous; front rather densely, finely asperate; eye with lower lobe strongly widened posteriorly; antennal tubercles robust, slightly prominent, at apex with a robust tooth. Pronotum somewhat longer than wide; basal and apical sulci straight, the former deep, the latter shallow;

disk with a number of fine, transverse rugosities. Scutellum transverse, apex rounded. Elytra gradually wider to beyond middle, then rounded to apices, which are subtruncate and distinctly dentate at tip; entire disk rather densely punctate, on anterior half much more coarsely so. Mesosternum somewhat elevated medially; apex truncate, deeply impressed at middle. Antennae wanting beyond scape; scape only attaining middle of vertex, coarsely densely asperate above. Profemora and protibiae unarmed.

Length 12.5 mm.; width 3 mm.

Type in British Museum (*laosensis*).

Type locality: Saigon, Cochin China (*Fouqueti*); Cambodia (*laosensis*).

Distribution.—French Indo-China.

FRENCH INDO-CHINA: ♀; Laos [BMNH]. ♂, ♀; Luang, Prabang. ♀; Pakhong. ♀; Paklay. 2♀; Cambodia. ♂; Saigon, Cochin China [all MRHNB].

The single example listed above from the British Museum is a paratype labelled by Breuning [correctly] as *Olenecamptus laosensis,* although in his original description he inadvertently places it in *Cylindrepomus.*

Olenecamptus palawanus new species (Pl. XII, fig. 14.)

The single specimen examined unfortunately did not have its coloration completely developed; it is most closely related to *fouqueti* but has two large maculae each side of pronotum and the elytral apices are not spinose, but obsoletely dentate.

Female. Elongate-ovate, rather robust, cylindrical; dark testaceous, covered sparsely with short testaceous pubescence and with chalky-white tomentum as follows: head with a broad vitta behind each upper lobe of eye; front largely white above and below. Pronotum with a broad macular vitta each side of disk reaching from apex to basal quarter, before base each side of middle a small macula, disk medially irregularly white. Scutellum entirely white. Elytra each with a large, oval macula at middle of base, just before middle a macula similar in size and shape, at apical two-fifths near suture a small elongate macula, and before apex three in a zigzag longitudinal line, the last one largest, the middle one smallest, and below humerus an elongate macula (indicated only on one side). Beneath dark testaceous, largely covered with white pubescence, much denser broadly on sides. Legs and antennae pale, covered with sparse white pubescence.

Head above, minutely alutaceous; front finely asperate; eye with lower lobe widened behind, lower margin oblique; antennal tubercles robust, widely divergent, well separated, briefly dentate at apex. Pronotum slightly longer than wide, distinctly broader at apex than at base, strongly constricted

basally; apical transverse sulcus feeble, basal one broad and deep; disk with a number of feeble transverse rugosities. Scutellum transverse, sides straight, apex strongly arcuate. Elytra gradually widened to before apex; apices separately rounded, the tips angulate or obsoletely dentate; entire surface with fine, well-spaced punctures. Mesosternal process narrowing posteriorly, the apex laterally expanded and medially distinctly emarginate; fifth sternite broad, as long as third and fourth together, medially with a broad transverse impression, apex narrowly emarginate. Protibiae not serrate. Antennae nearly twice length of body; scape reaching beyond middle of vertex, densely scabrous above; third segment not quite four times as long as first, feebly asperate above; fourth shorter, rest gradually decreasing in length except eleventh, which is longer than tenth.

Length 10 mm.; width 2 mm.

Holotype.—Female; Palawan, P. I.; (Doherty); [ANSP no. 8256].

Olenecamptus triplagiatus triplagiatus Jordan (Pl. XII, fig. 1.)

1894. *Olenecamptus triplagiatus* Jordan, Novit. Zool., 1, p. 232. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 551, fig. 556 [ex parte].

Easily distinguished from any other species in this genus by the two common large white tomentose maculae on the elytra, and the head above covered with the same tomentum.

Female. Elongate-oblong, slender, cylindrical; dark reddish-brown to fuscous, elytra slightly paler, all over clothed with grayish-white pubescence which is denser on front, above procoxae, and elytra, and thin on pronotum. Head above entirely densely white tomentose. Scutellum white tomentose. Elytra with two, large, common, white-tomentose maculae, the first basal, strongly rounded on posterior margin, feebly so on anterior, second just behind middle, strongly rounded on anterior margin, straight on posterior, both maculae narrowly margined with dark brown pubescence; beneath humeri an indistinct, oblong macula of white pubesence. Beneath piceous, uniformly grayish-white pubescent; abdominal sternites, except fifth, laterally with an obscure, elongate, oblique, brownish macula. Femora reddish-brown, tibiae and tarsi paler, grayish-white pubescent. Scape reddish-brown, grayish-white pubescent.

Head above and front alutaceous; front very sparsely asperate; antennal tubercles well separated, at apex feebly dentate; eye with lower lobe large, strongly widened posteriorly. Pronotum transverse, widest at apex; apical and basal sulci very deep, basal one curved medially; disk transversely carinate, the anterior carinae interrupted at middle. Scutellum transverse, sides and apex broadly arcuate. Elytra widened behind middle, apices shortly, obliquely truncate at suture, strongly dentate at tip; disk before middle coarsely transversely rugose, with well-spaced, moderate-sized punctures which become finer apically. Mesosternal process moderately elevated

medially, apical margin broadly, shallowly emarginate. Fifth sternite shallowly emarginate on apical margin. Antennae with scape reaching to basal third, strongly asperate; remaining segments missing.

Length 17 mm.; width 4.3 mm.

Type locality: Gold Coast.

Distribution.—West Africa.

GOLD COAST: ♀; S. Ashanti, nr. Kumasi (G. S. Cansdale) [BMNH]. TOGO: ♂; no locality data [RNS]. IVORY COAST: ♂, ♀; Dimbokro [MRNHB].

Olenecamptus triplagiatus maculosus new subspecies (Pl. XII, fig. 2.)

In this subspecific form the basal macula extends to the extreme lateral edge of the elytra including the humeral macula, and the posterior margin is feebly undulating; the post median macula is of nearly same width throughout and almost attains the lateral margin, the anterior and posterior margins are parallel on disk, the anterior one only oblique laterally.

Length 17.6 mm.; width 4.7 mm.

Holotype.—Male; Leverville, Belgian Congo, 1928 (Mme. J. Tinant) [MCB].

Allotype.—Female; Gabon, Bas-Ogooné, French Equatorial Africa [MRHNB].

Olenecamptus senegalensis Breuning (Pl. XII, fig. 15.)

1936. *Olenecamptus senegalensis* Breuning, Festschr. E. Strand., 1, p. 321; Nov. Ent., suppl. 3, 1, 1940, p. 554, fig. 563.

Easily distinguished from others of this group by the length of the humeral macula, which is nearly one-half length of the elytron; the transverse fasciform macula behind middle of elytra also helps to separate it from others.

Female. Elongate-oval, slender, cylindrical; dark reddish-brown, elytra paler; brownish-ashy pubescent, with dense, white tomentose markings as follows: head with vertex, front, and genae entirely white, a small macula at base each side, and a broad vitta behind eyes; each side just above lateral fascia and at middle a dark brown, elongate, triangular macula, that at middle very slender. Pronotum on disk with four, small, irregularly-shaped maculae, two basal and two apical; laterally a broad vitta above procoxae. Scutellum with basal angles dark. Elytra with a large, transverse, obcordate, common macula at base (surrounding scutellum), at center of disk at basal third a very small, round macula, just behind middle, a narrow, common, transverse, fasciform macula; humeral macula very long, reaching nearly to middle, strongly narrowed apically. Beneath reddish-brown, entirely densely white tomentose; first four sternites laterally each with a

small, rounded macula, decreasing in size from first to fourth; tarsi somewhat darker, thinly white pubescent. Antennae with scape reddish-brown, remaining segments testaceous; thinly ashy-gray pubescent.

Head above finely alutaceous; front sparsely, finely asperate; antennal tubercles very widely separated, at apex with a short, robust tooth. Pronotum feebly transverse, wider apically; apical and basal transverse sulci moderately deep, feebly curved medially; disk medially finely, transversely rugose. Scutellum transverse, sides and apex broadly arcuate. Elytra feebly widened behind middle; apices shortly, obliquely truncate from suture, at tip with a short, obtuse tooth; disk with moderate-sized, well-spaced punctures which become slightly smaller to apex. Mesosternal process well elevated medially, apex deeply, angularly emarginate. Antennae about twice the length of body; scape attaining basal third of head, dorsally moderately asperate; third segment three times length of scape, feebly asperate basally; fifth slightly longer than fourth, remaining segments gradually shorter, except eleventh which is slightly longer than tenth.

Length 13–16.5 mm.; width 2.8–4 mm.

Type in British Museum.

Type locality: Senegal.

Distribution.—West Africa.

Belgian Congo: ♀; no locality data [MRHNB]. Senegal: ♀; no locality data [BMNH]. Ivory Coast: ♀; Dimbokro [MRHNB].

Remarks.—The specimen from the Belgian Congo has the basal common macula more transverse and the small apical macula much smaller.

Olenecamptus tessellatus Distant

1898. *Olenecamptus tessellata* Distant, Ann. Mag. Nat. Hist. (7), I, p. 384.

"Ferruginous, marked and spotted with fuscous.

"Head long, with a distinct central striation, a prominent marginal ridge between antennal tubercles, with a narrow, central, and two broad lateral, cretaceous fasciae all united in front. Antennae much longer than body, scape robust and very coarsely punctate; third joint more than three times as long as first; apex of fourth joint and whole of remaining joints darker brown. Pronotum longer than broad, transversely striate, constricted posteriorly, profoundly sulcate before anterior and posterior margins, with a broad cretaceous fascia on each lateral margin. Scutellum subquadrate, impunctate. Elytra densely and coarsely punctate; each ornamented with four, large, irregularly shaped, cretaceous pubescent spots, one at base, second longest, about middle, third deeply notched, fourth smallest, near apex; humeral angle subprominent, lateral margins slightly concavely sinuate; apices very obliquely rounded. Body beneath griseously pubescent. 13 mm. Delogoa Bay (Africa)."

The above description, which is a copy of the original, as it stands cannot strictly be applied to *battangi,* which species follows. Perhaps Breuning's action in placing the latter as a synonym of it may be correct, but without a careful comparison with the type, this cannot be determined.

Olenecamptus battangi Villard (Pl. XI, fig. 8.)

1901. *Olenecamptus Battangi* Villard, Bull. Soc. Ent. France, p. 144.
1940. *Olenecamptus tessellatus* m. *battangi* Villard. Breuning, Nov. Ent., suppl. 3, 1, p. 552, fig. 557.

Closest to *O. fouqueti* in the maculation of the head, elytra, and undersurface of body, but at once distinct in the pronotum being vittate laterally and bimaculate basally; the head with a macula between antennal tubercules; and the elytra with only a single macula on side of disk. Moreover, the elytral apices are more acuminate, not subtruncate, and less distinctly dentate.

Male. Elongate-oblong, slender, cylindrical; entirely dark reddish-brown, covered with pale gray pubescence, with yellowish or white tomentose markings as follows: head above with a subtriangular macula each side of middle, more or less parallel mesally, and an irregular one between antennal tubercles; behind each eye a minute macula; eye margined above and below. Pronotum with a broad vitta each side of disk, interrupted before base, ending posteriorly in a distinct appendiform process; behind and slightly mesad of each vitta is an irregular macula before basal margin. Elytra each with four large maculae in a row on disk, the first three ovate, subequal in size, the fourth one irregular in outline, much smaller; near suture behind middle is an additional macula which is nearly equal to the apical one; behind humerus on side of disk is a minute, rounded spot. Body beneath each side with a broad vitta, which runs from head to tip of abdomen, wider posteriorly, on abdomen enclosing a fine brown macula on each sternite.

Head with front minutely asperate; eye with lower lobe expanded posteriorly; antennal tubercles robust, slightly prominent, at apex with a short, broad tooth. Pronotum one-quarter longer than wide, sides tumid medially; apical transverse sulcus broad, basal one deep, straight; disk with a few feeble rugosities each side of middle. Scutellum with apex rounded. Elytra with sides nearly parallel, tapering posteriorly from apical quarter; apices separately, narrowly subacuminate, with a feeble tooth at tip; disk entirely densely punctate. Mesosternum broadly tumid medially, apex of process strongly emarginate; fifth sternite slightly longer than fourth, apex broadly emarginate. Antennae more than twice length of body, fifth segment not quite attaining elytral apex; scape reaching beyond middle of vertex; third segment four times as long as first, fourth much shorter, fifth slightly longer, first four segments densely asperate above, apex of third and base of fourth

finely so, the latter segment smooth apically; first to ninth segments finely serrate beneath. Protibiae finely serrate below, profemora feebly rugose beneath.

Female. Pronotum one-eighth longer than wide; antennae and legs less elongate, unarmed, the former not twice as long as body, asperate only on scape and base of third segment; fifth sternite three times as long as fourth, deeply emarginate at apex.

Length 12–18 mm.; width 2.6–3.7 mm.

Type locality: Bagamoyo, E. Africa.

Distribution.—East Africa.

German East Africa: ♂; Namupa [MRHNB].

Tanganyika: ♀; Kilosa, Dec. 19, 1925 (N. C. E. Miller) [BMNH]. ♂; Mikindani [BMNH]. ♂; Lukuledi [RNS]. ♂, ♀; Lindi [RNS–♀; MRHNB–♂]. Mozambique: 3♀; Beira [RNS–1; NMSR–2].

Remarks.—The Kilosa specimen has the elytral maculae yellowish, and considerably smaller than the Mikindani example, and, furthermore, the apical macula is transversely ovate, not produced anteriorly along suture. In the examples from Beira, the basal elytral macula is elongate, triangular, and the two apical ones are united. Whether these differences are geographical or individual could not be determined with the limited material on hand.

Olenecamptus zanzibaricus new species (Pl. XII, fig. 9.)

Very closely related to *O. battangi,* and possibly only a subspecies of that form, but no intergradations are known. From that species it differs in its more slender form, more elongate pronotum, pronotal vittae entire, extending from base to apex, and elytra with apices more strongly acuminate and more distinctly dentate, the maculation differently disposed.

Male. Elongate-oblong, cylindrical, slender; entirely rather light reddish-brown, entirely uniformly covered with pale gray pubescence, with white tomentose markings as follows: head with an elongate, nearly parallel-sided macula each side above; maculate between antennal tubercles. Pronotum with a broad vitta each side of middle, parallel-sided, extending without interruption from apex to base, feebly convergent behind. Elytra each with six maculae, four in a longitudinal row at middle of disk, decreasing in size from base to apex, first at extreme base, arcuate, second at basal two-fifths, third at apical third, fourth preapical, and two near suture, first elongate, at middle, second minute, at apical fifth. Body beneath with a broad vitta from head to tip of body; abdomen with first four sternites laterally maculate with brown.

Head minutely alutaceous, impunctate; front finely asperate; antennal tubercles robust, slightly prominent, at apex with a short, broad tooth. Pronotum one-third longer than wide, sides tumid behind middle; apical and basal transverse sulci deep, the former broadened at middle; disk with very feeble rugosities medially. Scutellum rounded. Elytra with sides nearly parallel, tapering posteriorly from apical third; apices subacuminate, obliquely truncate from suture, with a short tooth at tip; disk rather densely, finely punctate, the punctures coarser on basal half. Mesosternum feebly tumid medially; apex broadly emarginate; fifth sternite slightly longer than fourth, apex narrowly emarginate. Antennae about twice length of body, the fifth segment nearly attaining elytral apex; scape reaching beyond middle of vertex; third segment four times as long as scape; fourth much shorter than third, remaining segments gradually shorter, eleventh one-half longer than tenth; first four segments densely asperate above, apex of fourth smooth, segments two to ten serrate beneath. Profemora feebly rugose beneath; protibiae finely serrate below.

Length 17 mm.; width 3.5 mm.

Holotype.—Male; Zanzibar; (C. Cooke) [MCZ].

Olenecamptus similis similis new species (Pl. XII, fig. 10.)

Very similar at first glance to *O. battangi,* but distinguished from that species by its small form; pronotum much more strongly elongate; elytra with tegumental color much paler than that of pronotum; pubescence pale fulvous, not ashy; pronotal vitta interrupted before middle as well as basally; and elytra with apices not at all acuminate, truncature between tooth and suture only feebly oblique.

Male. Elongate-oblong, cylindrical, slender; rather dark brown, elytra, legs, and antennae from third segment much paler; covered with ashy or fulvous pubescence and maculate with white tomentum as follows: head above with an elongate, quadrate or sub-ovate macula each side of middle, and maculate between antennal tubercles; this macula is sometimes divided. Pronotum with four maculae each side of disk, apical one largest, subquadrate, second slightly behind middle, distinctly smaller, elongate, and two minute ones at base, the mesal one often larger. Elytra each with six or seven maculae on disk, a large one at base, followed by a small one near side, the largest one before middle, the fourth near suture, behind middle, more or less ovate, fifth rounded, at apical quarter, sixth small near suture, often coalescent with the larger apical macula. Body beneath brown-ashy pubescent, broadly white vittate each side from behind eye to tip of abdomen; abdominal sternites each with a minute, broadly ovate macula laterally.

Head minutely alutaceous; front finely, densely asperate; antennal tubercles robust, slightly prominent, at apex with a short, acute tooth. Pronotum

nearly one-half again as long as wide, sides tumid behind middle; apical transverse sulcus broad, basal one deeper, straight; disk finely but distinctly, transversely rugose. Scutellum rounded. Elytra with sides subparallel, narrowed from apical quarter, apices not acuminate, the truncature from suture, short, feebly oblique, minutely dentate at tip; disk rather densely, finely punctate, more coarsely so on basal half. Mesosternum not tumid, its process truncate at apex; fifth sternite slightly longer than fourth, emarginate at apex. Antennae and forelegs exactly as in *zanzibaricus*.

Female. Pronotum more than one-fifth longer than wide; antennae and legs less elongate, unarmed, the former with sixth segment slightly surpassing elytral apex, asperate only on scape and base of third segment; fifth sternite as long as third and fourth together, broadly emarginate at apex.

Length 10–11 mm.; width 2.2 mm.

Holotype.—Male; Namupa, German East Africa [RNS].

Allotype.—Female; topotypic [RNS].

Paratype.—Male; topotypic [RNS].

Olenecamptus similis congoanus new subspecies (Pl. XII, fig. 11.)

Differs from the nymotype only as follows: body above uniform yellow-brown; the pronotum with discal maculae more widely separated; elytra with all the maculae greatly reduced in size, the basal and premedian maculae subequal in size, only slightly larger than others, the preapical one very small and widely separated from the fifth; abdominal sternites with lateral brown maculae much larger, at least half the length of sternites.

Length 13 mm.; width 2.5 mm.

Holotype.—Female; Luebo, Belgian Congo; (D. W. Snyder) [USNM].

Olenecamptus somalius new species (Pl. XII, fig. 8.)

While in many respects between *nubilus* and *battangi*, this species differs at once from the former in lacking white sides on elytra, and from the latter in basal macula of elytra being widely removed from basal margin.

Male. Elongate-oblong, slender, cylindrical; fuscous, elytra, legs, and antennae paler; pale gray pubescent, elytra on disk tinged with fulvous; maculate with white tomentum as follows: head above with a large macula or broad vitta each side of middle, narrowed anteriorly, very narrowly connected along upper portion of eye with the inter-antennal macula; front and genae largely whitish. Pronotum with a vitta each side of disk, nearly attaining apical margin, attenuate behind middle and terminating at basal fifth, basad and mesad of this a minute, indistinct macula. Elytra each with

six discal maculae, first small, irregular, slightly oblique, well behind scutellum but removed from suture, second by far the largest, premedian, subquadrate, sometimes connected to third, which is postmedian and close to suture, fourth small, discal, at apical third, fifth minute, sutural, and sixth preapical, elongate-ovate, very small. Body beneath fuscous, somewhat lighter laterally, as are the abdominal sternites apically; pale gray pubescent, indistinctly white vittate laterally, the vitta apparently not continued onto abdomen, but represented there by a triangular macula toward sides of each sternite.

Head minutely alutaceous; front densely, finely asperate; antennal tubercles robust, prominent, briefly dentate at apex. Pronotum one-third longer than wide, transverse sulci distinct, straight, apical one broader; disk rather coarsely, densely, transversely rugose. Scutellum rounded. Elytra subparallel, rounded from apical third, apices obliquely truncate from suture, not acuminate, feebly dentate at tip; disk densely, finely punctate, more coarsely so on basal half. Mesosternum broadly tumid medially, its process deeply emarginate at apex; fifth sternite distinctly longer than fourth, apex distinctly emarginate; profemora and protibiae finely serrate beneath. Antennae more than twice length of body, fifth segment nearly attaining elytral apex; scape reaching beyond middle of vertex; third segment three and one-half times as long as first, fourth much shorter than third, rest feebly shorter (wanting from seventh); third to seventh segments strongly serrate beneath.

Length 14 mm.; width 3.2 mm.

Holotype.—Male; Giuba, Italian Somaliland; [RNS].

Remarks.—Possibly a subspecies of *battangi* but there are no known intermediate forms.

Olenecamptus nubilus Jordan (Pl. XII, fig. 7.)

1904. *Olenecamptus nubilus* Jordan, Nov. Zool., XI, p. 365. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 552, fig. 560.

Related to *battangi* but quite distinct from it and all other known species in having the sides of elytra strongly white pubescent. The pubescence of the head above and pronotum anteriorly is quite white in certain lights so that, as a consequence, the tomentose maculation is indistinct. Furthermore, the pattern of markings on the elytra is unique.

Male. Elongate-oblong, very slender, cylindrical; dark brown, elytra, antennae, and legs paler, covered with ashy and pale gray-white pubescence and with white tomentose markings as follows: head very pale above, with an indistinct vitta each side and a small macula between antennal tubercles. Pronotum each side of disk with a very irregular, indistinct vitta, interrupted before base, supplemented there with an elongate, minute macula (quite as in *battangi*). Elytra laterally distinctly white pubescent, the pubescence ex-

tending onto disk at apex without forming a distinct macula there, each with five maculae on disk (or four), first large, elongate, narrowly attaining base, irregular in outline, second transverse, equally large, before middle, next three minute, arranged in a triangle, one discal, between the other two, which are near suture. Body beneath ashy pubescent, with a broad, indefinite, white vitta each side, on abdomen enclosing indistinct brownish maculae.

Head minutely alutaceous; front rather densely, finely asperate; antennal tubercles robust, prominent, distinctly dentate at apex. Pronotum one-third longer than wide, transverse sulci distinct, arcuate, basal one deeper; disk rather coarsely, not very densely, transversely rugose. Scutellum rounded. Elytra more or less parallel-sided, widened anteriorly, apices separately rounded, slightly prolonged, dentate finely at tip; disk densely, rather finely punctate, more coarsely so on basal half. Mesosternum slightly tumid medially, its process slightly emarginate at apex; fifth sternite a little longer than fourth, feebly emarginate apically. Profemora and protibiae finely serrate beneath. Antennae more than twice length of body, fifth segment nearly attaining elytral apex, serrate beneath from third to eleventh segment; scape reaching behind middle of vertex; third segment nearly four times as long as first; fourth much shorter than third, rest gradually diminishing, eleventh with a long appendix.

Length 11–16 mm.; width 2.5–3.5 mm.

Type locality: Kitui [Kitwi], Br. E. Afr.

Distribution.—Uganda to Tanganyika.

UGANDA: ♂; Kitwi [RNS]. ♂; Jkutha [MRHNB]. TANGANYIKA: ♂; Kidugala, Uheheland [RNS].

Olenecamptus vittatus Breuning

1940. *Olenecamptus tessellatus* m. *vittata* Breuning, Nov. Ent., suppl. 3, 1, p. 552, fig. 558.

"All the elytral spots are united into one longitudinal discal band, very attenuate after the middle of the side.

"Type—Male; from Belgian Congo: Lulua, Kapanga; from the Museum of Tervueren." (Translation of the original description.)

Remarks.—As Breuning's figure shows this species to lack basal elytral spots, the present writers feel that it must be separated as a full species and that it must be placed near *olenus*.

Olenecamptus rhodesianus new species

Close to *O. olenus* but the vittae on head converge at vertex; the vittae on pronotum are convergent at base, but do not meet entirely; macula at center of base of elytron, slender, single, vittaform.

Female. Elongate-oblong, slender, cylindrical; reddish-brown, elytra slightly paler, entire upper surface covered with thin, pale ashy pubescence, and with dense, white tomentum as follows: head on vertex with a broad vitta each side of middle beginning behind antennal tubercle, divergent posteriorly, continued onto pronotum, where each is broad, anteriorly irregularly constricted, narrowed and convergent towards base. Elytra each with a short streak at middle of base and with two large maculae on disk, one at center and a slightly smaller one at apical quarter, the two more or less connected by a slender process. Body beneath piceous, sparsely hoary pubescent, the pubescence denser laterally; abdomen with a rounded, glabrous macula near sides of each sternite, maculae decreasing in size posteriorly. Legs and scape reddish-brown, tibiae and tarsi paler; entirely covered with hoary pubescence (antennae wanting from scape).

Head minutely, densely alutaceous; front rather densely asperate, but not coarsely so; eye with lower margin oblique, feebly indented at its middle; antennal tubercles robust, prominent, separated, with a short tooth at apex. Pronotum distinctly longer than wide, slightly wider near apex than at base, sides constricted deeply before base, less distinctly so apically; disk rather feebly transversely rugose; basal transverse sulcus deep, slightly arcuate, apical one broad, distinct. Scutellum transverse, short, nearly semi-circular. Elytra feebly wider behind middle, apices separately rounded, with a short, obtuse tooth at tip; entire disk finely, rather densely punctate, posteriorly from middle a little more densely so. Mesosternal process gradually narrowed posteriorly, apex emarginate, expanded each side; fifth sternite equal to third and fourth together, with a broad, feebly elevated, transverse ridge near apex, apex deeply emarginate. Procoxae minutely tuberculate anteriorly; profemora and protibiae not serrate. Antennae wanting beyond scape; scape reaching slightly behind middle of vertex, coarsely, densely asperate above.

Length 13 mm.; width 3 mm.

Holotype.—Female; Umtali, Southern Rhodesia; [AMNH].

Olenecamptus olenus Gahan (Pl. XII, fig. 13.)

1904. *Olenecamptus olenus* Gahan, Dist. Ins. Transvaal, p. 143, pl. 14, fig. 1. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 552, fig. 559.

Close to *O. rhodesianus* but the vittae on vertex do not converge on vertex, there are two maculae at center of base, and the large maculae at middle are narrowly margined with brown; as in the afore-mentioned, there is no humeral macula.

Female. Elongate-oblong, slender, cylindrical; reddish-brown, densely cinereous pubescent, with dense tomentose markings of white as follows: head with a broad vitta either side of middle from occiput to behind upper lobe of eye, not converging but parallel; a small, dark brown, triangular macula at middle of occiput at base. Pronotum either side of middle with

a broad vitta, placed more or less laterally, slightly widened basally. Elytra each with four maculae, two at center of extreme base, small, elongate, inner one closer to base, third largest, at middle, elongate-ovate, and fourth at basal third, small, oval; there is no humeral macula. Beneath piceous, densely cinereous pubescent; each sternite laterally with an obscure, darkish, elongate macula. Legs and antennae medium reddish-brown, thinly cinereous pubescent.

Head above finely alutaceous; front finely, sparsely asperate; antennal tubercles well-separated, at apex with a short, robust tooth; eye with lower lobe large; moderately widened posteriorly. Pronotum distinctly elongate; slightly wider apically; apical sulcus moderately deep, basal one deeper, apical curved medially; disk moderately, transversely rugose. Elytra slightly widened behind middle; apices shortly, obliquely truncate at suture; apex feebly, obtusely dentate; entire disk with fine, well spaced, distinct punctures. Mesosternal process feebly elevated medially; apical margin broadly marginate. Antennae with eight segments, remaining missing; scape reaching behind middle of head, dorsally strongly asperate; third segment three and one-half times length of scape, finely asperate on basal two-thirds; fifth slightly longer than fourth; remaining segments gradually shorter.

Length 14.5 mm.; width 3.3 mm.

Type locality: Transvaal.

Distribution.—Southern Africa.

South Africa: ♀; Chunas Poort; January 13, 1926; (Prof. J. C. Fance) [BMNH].

Southern Rhodesia: ♂, 5♀; Sawmills, Nov.–December, 1921, 1923; [NMSR].

Remarks.—The above description is based on the specimen from the British Museum as it was closest to the type description. The six specimens from Sawmills, National Museum of Southern Rhodesia, are all different, some lacking the basal macula of the elytron, some with a very small macula near suture at middle, and some with a small macula at apex, and some with both of the last two mentioned maculae.

Olenecamptus australis new species (Pl. XII, fig. 12.)

Differs from *O. rhodesianus* in the following ways: thinly ashy pubescent; head above with the vittae parallel; pronotal discal vittae parallel and of nearly equal width throughout; elytral maculae all surrounded by a darker brown margin; pronotal disk obsoletely transversely rugose if at all; elytra more coarsely punctate.

Female. Elongate-oblong, slender, cylindrical; medium reddish-brown, thinly ashy-gray pubescent. Head above with a rather broad white vitta

behind each upper lobe; these are parallel. Pronotum with a broad, white vitta either side of middle (continuing those of head), parallel and only feebly wider apically than basally. Elytra each with a short, very narrow, white macula at middle of base, and with two, large, elongate-oval, white maculae (one before middle and one behind) which are connected; at apical quarter near suture a very small, oval macula, and at apex a larger, more broadly oval one of same pubesence, all maculae margined by a dark brown area which is continuous between the maculae of the disk. Beneath dark reddish-brown, entirely ashy-gray pubescent; sternites one to three with a small, indistinct, dark brown macula laterally. Legs with femora reddish-brown, tibiae, and tarsi testaceous; entirely ashy pubescent. Antennae with scape, basal half of third segment, and extreme apex of all segments reddish-brown, remainder nearly testaceous; all thinly ashy-gray pubescent.

Head above minutely alutaceous; front alutaceous and sparsely but strongly asperate; eye with lower lobe large, strongly widened posteriorly; antennal tubercles well-separated basally, with a short, robust tooth at apex. Pronotum elongate, apex feebly wider than base; basal and apical sulci wide, rather shallow, feebly curved medially; disk obsoletely rugose. Scutellum transverse, sides and apex arcuate. Elytra feebly widened behind middle; apices at suture obliquely truncate, obtusely toothed at outer angle; disk at base rather coarsely, closely punctate, punctures a little finer towards apex. Mesosternal process feebly elevated medially, apical margin emarginate; fifth sternite strongly emarginate at tip. Antennae about one and two-thirds body length; scape reaching to beyond middle of head, dorsally strongly asperate; third segment more than three times length of scape, feebly asperate dorsally; fourth longer than fifth, remaining segments gradually shorter, except eleventh which is longer than tenth.

Length 14.6 mm.; width 3.5 mm.

Holotype.—Female; Insuza River, Victoria Falls Road, Southern Rhodesia; November 15, 1939 [NMSR].

Olenecamptus patrizii Aurivillius (Pl. XIV, fig. 4.)

1928. *Olenecamptus patrizii* Aurivillius, Ann. Mus. Civ. Stov. Nat. Genova, LII, p. 479.

1940. *Olenecamptus patricii* Aurivillius. Breuning, Nov. Ent., suppl. 3, I, p. 551.

Male. Elongate-oblong, slender, cylindrical, light reddish-brown, elytra nearly testaceous. Head and pronotum and scutellum with variegated pubescence of white and grayish-yellow; front nearly entirely grayish-yellow. Elytra with same pubescence, and with five, large, indistinct, rounded maculae of whitish pubescence, narrowly annulate with pale fulvous pubescence as follows: each with an elongate one at suture behind scutellum, a smaller round one behind humerus, before middle (the largest) which is transverse nearly reaching from suture to lateral margin, a smaller, rounded

one at apical third, and one nearly same size at apex which is more oval and oblique, between the anterior and post-median is a common, transverse macula at suture and between post-median and apical another common macula which is slightly smaller than the preceding. Beneath medium reddish-brown somewhat interspersed with patches of testaceous, entirely clothed with grayish-white pubesence, with scattered, indistinct, irregular patches of yellowish-gray or brownish pubescence; there are small, scattered glabrous maculae on entire undersurface. Legs with femora reddish-brown, tibiae and tarsi testaceous, entirely pale grayish-white pubescent. Antennae with scape and apices of fourth and succeeding segments reddish-brown, remaining segments testaceous, except eleventh which has a single annulation of reddish-brown at apical two-thirds.

Head above finely alutaceous; front very sparsely, coarsely asperate; antennal tubercles set approximate basally, dentate apically. Pronotum elongate, slightly wider at apex than at base, widest just before basal sulcus; apical and basal sulci wide, curved medially; disk with few, feeble transverse rugosities; entire surface with coarse, deep, well-spaced punctures. Scutellum transverse, apex and sides arcuate. Elytra feebly attenuate; apices feebly obliquely emarginate; entire disk rather densely, coarsely, deeply punctate. Mesosternum feebly and broadly tumid at base medially; process dilated at apex and emarginate. Profemora and protibiae sparsely asperate dorsally, feebly serrate ventrally. Antennae with sixth segment nearly attaining elytral apices, one and two-thirds times body length; scape reaching to behind middle of pronotum, moderately asperate dorsally; third segment more than four times length of scape, dorsally feebly asperate, ventrally feebly serrate; fourth distinctly longer than fifth; remaining segments gradually shorter, except eleventh which is slightly longer than tenth.

Length 12.5 mm.; width 2.5 mm.

Type in Naturhistorische Riksmuseum of Stockholm.

Type locality: Somaliland: Giuba and Rahaniun.

Italian Somaliland: Male; Giuba, 1923; (Jack Sciuino) [RNS—Type].

Olenecamptus griseipennis Pic (Pl. XIII, fig. 5.)

1932. *Cylindropemus* [!] *griseipennis* Pic, Bull. Soc. Ent. France, xxxvii, p. 138.

1940. *Olenecamptus griseipennis* Pic. Breuning, Nov. Ent., suppl. 3, i, p. 557.

1942. *Olenecamptus montanus* Gressitt, Lingnan Nat. Hist. Surv. and Mus., Spec. Publ., iii, p. 4.

Distinguished by the uniformly dark gray elytra and the yellowish vittae on head and pronotum.

Female. Elongate-ovate, cylindrical, slender; piceous; elytra and underparts slightly paler brown; clothed with cinereous pubescence. Head above

with an ochraceous vitta each side, coalescent anteriorly and extending to antennal tubercles; eye internally margined with ochraceous. Pronotum on disk with a broad vitta each side, widened internally behind apex, and contiguous with one another; above coxae a very narrow, similarly colored vitta, continuing indistinctly to tip of metepisternum.

Head minutely alutaceous; front minutely asperate; eye with lower lobe strongly narrowed anteriorly; antennal tubercles prominent, with a long, acute tooth at apex. Pronotum slightly longer than wide, sides tumid behind middle, apical transverse sulcus broad, shallow, basal one deep medially; disk with a number of fine transverse carinae, especially along middle. Scutellum rounded. Elytra widened behind middle; apices obliquely truncate, the external angle slightly pronounced; entire disk rather densely and finely punctate, punctures a little finer apically. Mesosternal process emarginate apically; fifth sternite as long as third and fourth together, impressed medially, apex distinctly emarginate. Profemora and protibiae unarmed. Antennae more than half again as long as body; scape and base of third segment asperate above; third segment four times as long as scape, nearly twice as long as fourth, which is shorter than fifth.

Length 10 mm.; width 2.5 mm.

Type locality: Yunnan, China [*griseipennis*]; Paohsin, Sikang, China [*montanus*].

Distribution.—China.

CHINA: ♀; North China [BMNH].

Olenecamptus quietus Pascoe

1866. *Olenecamptus quietus* Pascoe, Proc. Zool. Soc. Lond., p. 254. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 558.

"Luteus, with a closely set yellowish pile above, beneath glossy black; propectus, sides of postpectus, and abdomen with a whitish pile. Head nearly impunctate. Prothorax scarcely longer than broad, not corrugated. Scutellum semicircular. Elytra with sides nearly parallel at basal half, thence slightly diverging until towards apex, where they are rounded off, apex itself of each elytron slightly truncate but scarcely mucronate. Legs glossy brown, tibiae and tarsi of fore and intermediate legs luteus. Antennae brown, not scabrous. Length five lines. Penang."

Olenecamptus sarawakensis Breuning (Pl. XIII, fig. 18.)

1936. *Olenecamptus sarawakensis* Breuning, Festschr. E. Strand, 1, p. 319; Nov. Ent., suppl. 3, 1, 1940, p. 546, fig. 542.

Sarawakensis is readily distinguished by the peculiar pattern of the elytra, having only a short sutural stripe at base, three short vittae well behind middle on disk, and several small maculae before apex.

Male. Elongate-oblong, rather slender, cylindrical; dark reddish-brown, entirely covered with sparse, very fine gray pubescence, and with deep yellow markings as follows: head with six small maculae each side, one laterally on antennal tubercle, one on upper margin of isthmus (arcuate), four behind posterior margin of eye (the largest more lateral). Pronotum with small indistinct macula at apex, laterally. Scutellum yellow pubescent on apical two-thirds. Elytra each with a short macular vitta basally just behind scutellum, and just behind middle three short macular vittae, the lateral one continuous and widest, and longest, the inner two broken into smaller maculae, two or three small maculae at apex; beneath humerus two small maculae, one behind the other; just anterior to the vittae behind middle is a large, rather indistinct oval macula of dark-brown pubescence. Beneath dark reddish-brown to piceous, abdomen paler medially, thinly gray pubescent; mesosternal side-pieces laterally narrowly margined with deep yellow pubescence; the second sternite laterally with one elongate, rather narrow macula, the third each side with two, the most lateral widest, the fourth with two, the most lateral enclosing a brown macula, and the fifth with a rather large triangular one at base, not attaining apex. Femora piceous, with extreme apices and bases paler; tibiae and tarsi medium reddish-brown; entire leg clothed rather thinly with fine gray pubescence. Antennae dark reddish-brown, from fifth segment paler, with thin gray pubescence.

Head above alutaceous; front alutaceous, with sparse, coarse asperities; eye with lower lobe strongly widened posteriorly; antennal tubercles subcontiguous at base, at apex strongly dentate. Pronotum elongate; apex wider than base; apical sulcus shallow, curved medially, basal one deep, feebly curved at middle; disk transversely rugose medially. Elytra gradually attenuate apically; apices shallowly emarginately truncate, not dentate; entire disk rather coarsely, reticularly punctate. Mesosternum very feebly elevated basally, at apex narrowed, angularly emarginate. Profemora and protibiae feebly serrate. Antennae twice length of body; scape reaching beyond middle of head, densely asperate dorsally; third segment sparsely asperate dorsally, moderately serrate beneath, three and one-half times length of scape; fourth longer than fifth, remaining segments gradually shorter, except eleventh which is longer than tenth; fifth to seventh segments feebly asperate and serrate.

Length 12 mm.; width 2.5 mm.

Type in British Museum.

Type locality: Sarawak.

Distribution.—Borneo.

Borneo: ♂; Quop, W. Sarawak (G. E. Bryant) [BMNH—paratype]. ♀; Sambas [RNHL].

Olenecamptus basalis Gahan (Pl. XIII, fig. 2.)

1900. *Olenecamptus basalis* Gahan, Christmas Island, p. 122. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 557, fig. 574.

Unique in having coarse granulate punctures on the occiput and vertex; the elytral apices are also very strongly acuminate. In addition it differs from *bilobus* in lacking the basal white maculae on the pronotum.

Male. Elongate-oblong, slender, cylindrical; dark reddish-brown, elytra slightly paler, densely tawny pubescent. Head above at base with five, small, triangular maculae in a transverse row, all connected at base, the extreme lateral ones elongate; entire surface with well-spaced, very small, rounded, dark brown dots. Pronotum with the carinae mostly glabrous and appearing as dark brown, narrow, transverse fasciae, laterally a very narrow, dark brown vitta which is irregular in shape. Scutellum pale tawny pubescent. Elytra with basal fifth white or yellowish-white pubescent, the pubescence extending along sides to basal third; just behind scutellum near suture each elytron with a small, rounded, tawny or white macula, and behind middle another small, more or less elongate macula of white or tawny; the humeral macula tawny, elongate, its upper margin singly indented; all elytral maculae margined with a narrow brown border. Beneath dark reddish-brown to piceous, brownish-gray pubescent medially, laterally broadly, tawny pubescent; first sternite laterally with one large, irregular macula either side, second, third, and fourth with two slightly smaller, irregular maculae either side and fifth sternite with one small, triangular macula either side. Femora dark reddish-brown, tibiae and tarsi paler; thinly grayish pubescent. Antennae medium reddish-brown, paler beyond fourth segment, thinly grayish pubescent.

Head above with well-spaced, coarse granulate-punctures; front sparsely asperate; eye with lower lobe large, strongly widened posteriorly; behind eye with a narrow strip of granulate-punctures; antennal tubercles strongly divergent, with a short, robust tooth at apex. Pronotum feebly elongate; apex slightly wider than base; apical and basal sulci deep, both feebly curved medially; disk usually rather irregularly transversely carinate. Scutellum transverse, sides broadly rounded, apex moderately arcuate. Elytra with sides gradually attenuate to apex; apices narrow, very shortly, obliquely truncate at suture; apex with a short, obtuse tooth; base feebly rugose; moderately punctate, punctures distinct to apex. Mesosternum subtuberculate anteriorly; process at apex deeply, angularly emarginate. Femora and tibiae with coarse, well-spaced punctures on entire surface; tibiae serrate on inner margin. Antennae about two and one-quarter times body length; scape about two-thirds length of head, robust, strongly, coarsely asperate dorsally; third segment nearly four times length of scape; fifth segment slightly longer than fourth, remaining segments gradually shorter; eleventh segment slightly longer than tenth; asperate finely for nearly entire length, serrate on inner side to tenth segment.

Length 14.3–18.5 mm.; width 3.5–4.3 mm.

Type locality: Christmas Island.

Distribution.—Christmas Island.

CHRISTMAS ISLAND: ♂; Darling [BMNH]. ♂; Flying Fish Cove (C. W. Andrews) [BMNH].

Olenecamptus serratus Chevrolat (Pl. XIII, fig. 3.)

1835. *Olenecamptus serratus* Chevrolat, Mag. Zool., v, Ins., pl. 134. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 556, fig. 571.

Quite similar to *bilobus* but the elytra each have only a small, rounded, yellowish macula behind scutellum and a similar white macula at middle of disk.

Male. Elongate-oblong, slender, cylindrical; medium reddish-brown to piceous, elytra paler; head above and pronotum deep tawny pubescent, elytra paler tawny pubescent. Front and margin of eyes pale yellowish-white pubescent; behind each eye at middle above with a very fine, glabrous, dark brown vitta; a median vitta short, confined to base. Pronotum with a broad vitta, the upper margin of which is irregular, a small, triangular macula at base either side of middle, and a small elongate one at middle, white or yellowish-white. Scutellum densely white tomentose. Elytra each with a small, rounded or slightly transverse, yellowish-white (or sulfur yellow) macula on basal fifth near suture and with another of equal size or slightly larger of dense white tomentum at middle on center of disk; the humeral macula has one deep dentation along its upper margin; all maculae have a narrow brown margin. Beneath medium to dark reddish-brown, abdomen paler, densely white or yellowish-white tomentose; first sternite laterally with an oblique, elongate macula; second, third, and fourth with two more or less rounded maculae each side, and fifth with a single, feebly elongate macula laterally near base. Antennae medium reddish-brown, paler from fourth, yellowish-white pubescent. Legs with femora medium to dark reddish-brown, tibiae and tarsi paler; entirely yellowish-white pubescent.

Head above and front alutaceous, front not visibly asperate; antennal tubercles strongly divergent, at apex with a short, robust tooth; eye with lower lobe large, strongly widened posteriorly. Pronotum feebly elongate; basal and apical sulci deep, apical one curved medially; base slightly wider than apex; disk transversely carinate, carinae toward apex interrupted medially. Scutellum transverse, sides broadly arcuate, apex subacutely rounded. Elytra with sides gradually attenuate to apices, which are separately rather narrowly rounded, obliquely truncate at sutural margin, and with a short, robust tooth at tip; disk basally feebly, transversely rugose, with moderate-sized, well spaced punctures, punctures becoming finer towards apex. Mesosternal process deeply, rather broadly emarginate at apex, anteriorly subtuberculate. Fifth sternite feebly emarginate at apex. Antennae about two and a half times body length; scape reaching to middle of head, strongly asperate dorsally; third segment four times length of scape, finely asperate;

fourth and fifth subequal; remaining segments gradually shorter, except eleventh, which is almost half again as long as tenth.

Female. More robust; elytra slightly widened behind middle; mesosternum less strongly subtuberculate anteriorly; antennae nearly two times body length, fifth segment slightly longer than fourth.

Length 12–15.5 mm.; width 2.8–3.7 mm.

Type locality: Trincomali, Ceylon.

Distribution.—Ceylon and India.

CEYLON: ♀; Pundaloya, C. P., about 3,000 ft. [BMNH]. INDIA: ♂; Anthapur, October 1897 [BMNH]. ♀; Maissour, Aynur, 1897 [BMNH].

Remarks.—The female from Ceylon and the one from India have the maculae on base of elytra rounded while the Indian male has the basal maculae square and more yellowish.

Olenecamptus bilobus bilobus Fabricius (Pl. X, fig. 1.)

1801. *Saperda biloba* Fabricius, Syst. Eleuth., II, p. 324. Erichson, Nova Acta. Acad. Nat. Cur., XVI, suppl. 1, 1834, p. 269, pl. 39, fig. 9. Boisduval, Voy. Astrolabe, Ins., II, 1835, p. 527.

1866. *Olenecamptus bilobus* Fabricius. Pascoe, Proc. Zool. Soc. Lond., p. 253.

This very wide-spread and common insect is distinguished by the presence of two maculae on the base of the pronotum, the form of the postscutellar macula, and the dense white tomentum of the undersurface.

Male. Elongate-oblong; rather slender, cylindrical; testaceous or reddish-brown, rather densely, pale grayish-fulvous pubescent and with dense, white tomentose markings, outlined with darker brownish, as follows: head with front, genae, and sides entirely white. Pronotum with a small, triangular macula at base either side of middle. Scutellum entirely white. Elytra with a large, common, bilobed macula at base which attains the scutellum; below humerus on lateral edge, a broad, elongate macula, narrowed at middle, re-expanded at apex, attaining the basal third of elytra; at apical third a moderately large, rounded macula on center of each disk. Beneath entirely densely white tomentose, except a small, elongate, glabrous macula on first and second sternites laterally. Legs testaceous or reddish-brown; femora thinly white pubescent, tibiae and tarsi thinly gray pubescent. Antennae testaceous or reddish-brown, scape darker, entirely covered with thin, pale pubescence.

Sculpturing on head concealed by pubescence; eye with lower lobe transverse, strongly widened posteriorly; antennal tubercles prominent, well separated, at apex with a short, robust tooth. Pronotum elongate, feebly narrower at base than at apex; basal and apical sulci wide and deep, apical one curved medially; disk transversely rugose. Scutellum transverse, sides

and apex broadly arcuate. Elytra gradually attenuate to apices, which are very shortly truncate on inner side, with a strong tooth at tip; entire disk with small, well-spaced punctures, which are deep to middle thence to apex more shallow and smaller. Mesosternal process short, moderately wide, at apex emarginate; fifth sternite strongly attenuate to apex, apex broadly emarginate. Profemora robust, on lower surface finely rugose; protibiae densely, rather coarsely serrate. Antennae elongate, the fourth segment attaining elytral apex; scape reaching beyond middle of head, asperate dorsally; third segment more than four times length of scape; remaining segments much shorter and subequal.

Length 17–18 mm.; width 4 mm.

Type locality: "Insulis oceani australis."

Distribution.—Northern Australia.

AUSTRALIA: ♂; Eudenvim River, Queensland [AMNH]. ♂; Queensland [RNHS]. 4♂, 3♀; no locality data [MRHNB].

Olenecamptus bilobus strucki new subspecies (Pl. X, fig. 2.)

1926. *Olenecamptus bilobus* Fabricius. Kriesche, Ent. Zeitung (Stettin), LXXXVII, p. 375.

1940. *Olenecamptus bilobus dahli* Kriesche. Breuning, Nov. Ent., suppl. 3, vol. I, p. 556 [in part].

1855. *Gnoma* (?) *biloba* Fabricius. Montrouzier, Ann. Soc. Agr. Lyon, (2), VII, p. 63 [Woodlark Is.].

Male. Close to the nymotype but differs as follows: the large, postscutellar, common white macula not bilobed, feebly emarginate posteriorly, anteriorly the macula envelopes the scutellum to a much greater degree; the lateral humeral macula is entire along its inner margin; the macula at apical third more elongate-oval, not so round as in *bilobus;* beneath densely grayish-yellow pubescent; legs thinly gray pubescent. At elytral apices the truncation is much longer and only very feebly dentate at tip. Female as male but pronotum shorter, nearly transverse; antennae slightly shorter than male's which are two and one-fourth to two and one-half times body length.

Length 10.6–14.2 mm.; width 2.3–3 mm.

Holotype.—Male; Astrolabe Bay, German New Guinea (Rhode) [ANSP no. 8250].

Allotype.—Female; Cape Sud Est, Oro Bay, December 5; (Struck) [authors' coll.].

Paratypes.—2 females; topotypic [ANSP]. Female; Monda, Papua, Buna District, Aug. 6, 1943 (W. G. Bodenstein) [CU]. 2 females; Stephansort, Astrolabe Bay, German New Guinea, 1894 (Kunzemann) [ANSP]. Male; Ighihirei, New Guinea, July–August, 1890 [USNM]. Male; Anday, New Guinea [ANSP].

Dutch New Guinea: male, 2 females; Hollandia, 300–600 m., Jan. 1938 [BMNH]. 7 males, 7 females; Humboldt Bay Dist., July–Sept. '37 [BMNH]. 4 males, 7 females; Sabron, Cyclops Mts., 2000 ft. [BMNH]. Female; Iffar, Lake Sentani, Aug. '36 [BMNH]. Papua: 3 males, female; Kokoda, 1200 ft., Sept. '33 [BMNH]. Male; Robinson R. [CNHM]. Female; Stephansort, Astrolabe Bay [RNHS]. Female; Morobe dist. [MCZ]. 3 males, 2 females; Hollandia, May and Jan. 1945 [USNM—male, female; CAS—2 males, female]. Male, female; Snow Mts. to 3500 ft., Oct.–Dec. 1910; (Meek) [MRHNB]. British New Guinea: male; Mamberamo Riv., 1920 [USNM]. Male, female; British New Guinea [MCZ]. New Guinea: 6 males, female; no locality data [USNM]. 2 males; Ighibirei, Loria, July–Aug. 1890 [USNM]. Female; Hallam [MRHNB]. 5 males, female; Daru [CAS]. Male; Baffin Bay [CAS]. Male; Biak Isl. [CAS]. 5 males, female; Finschhafen, April 15 (E. S. Ross) [CAS].

Remarks.—Two additional specimens, male and female, the male labeled as coming from Ternate, Moluccas, the female from Ceram, are identical with the above and may be incorrectly labelled or transported to that locality.

Eight specimens from Borneo are referred here to the present form. Two of these in the British Museum differ in having the postscutellar macula produced anteriad of the scutellum; the others in the Philadelphia Academy of Natural Sciences and the Leiden Museum, are entirely as in *b. strucki.*

Olenecamptus bilobus dahli Kriesche (Pl. X, fig. 3.)

1926. *Olenecamptus bilobus dahli* Kriesche, Ent. Zeitung (Stettin), LXXXVII, p. 375. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 556 [in part].

Differs from the nymotypic form in having the common basal elytral macula only very feebly obcordate posteriorly; the elytral macula behind middle is elongate with the outer anterior angle produced.

Type locality: New Pomerania.

Distribution.—New Britain.

NEW BRITAIN: 4; Iboki to Talasea, Dec. 193[0] [Australian Museum].

Remarks.—The figure and description are based on a sketch supplied very kindly by Mr. Keith McKeown.

Olenecamptus bilobus ternatus new subspecies (Pl. X, fig. 4.)

1940. *Olenecamptus bilobus* Fabricius. Breuning, Nov. Ent., suppl. 3, 1, p. 555 [ex parte].

Differs from the typical form in having the surface color dark reddish-brown, and the general pubescence grayish-white; the common white postscutellar macula strongly transverse, less strongly bilobed, and each lobe broadly emarginate posteriorly; the lateral humeral macula abruptly narrowed after the middle; at basal quarter on side of disk, a small, rounded, white macula; the macula at apical third usually much smaller, sometimes nearly oval. The elytral apices more nearly resemble those of *bilobus strucki* but are more acuminate and even more strongly truncate, with a feeble tooth at tip. Female as in ♂ but pronotum nearly transverse and elytra less acuminate apically; antennae shorter.

Length 13–15 mm.; width 2.7–3.3 mm.

Holotype.—Male; Ternate, Moluccas [ANSP number 8251].

Allotype.—Female; Batjan [ANSP].

Paratypes.—Moluccas: Male; topotypic [USNM]. Female; Batjan [ANSP]. Male, female; Halmahera [MCZ]. Female; Gamkonora, Halmahera [BMNH]. 2 males, female; Ternate (L. Laglaize) [MRHNB]. 5 males, 4 females; no locality data [RNHL]. Indies Nederlandaises (van Lansberg) [MRHNB]. Celebes: male, female; Kalabat, March '31 [BMNH]. 2 males; Koelawi, Dec. 1918 [RNS: RNHL]. Female; Toli-Toli, November–December, 1895 (Fruhstorfer) [USNM]. Female; Goeroepahi, Mongondon, July [RNHL].

Remarks.—The Celebes specimens agree among themselves in having the postscutellar macula somewhat broader, and, as a consequence, less strongly transverse; in all principal characters, however, they are as the Moluccan representatives. Three specimens labelled Celebes from the Belgian Museum do not agree with the typical *ternatus* and are probably mislabelled.

Olenecamptus bilobus mindanaensis new subspecies (Pl. X, fig. 5.)

Body color slightly darker than in the typical form, and general pubescence more grayish; the common basal macula very closely approximating that of *b. bilobus* but the anterior end envelopes more of the scutellum as in *strucki,* which it also resembles in the presence of the small, white macula between the large basal macula and the humeral one, and the shape of the humeral macula; the pubescence is more grayish beneath. The elytral apex is strongly truncate as in *b. strucki* but more strongly dentate at tip and less acuminate. Female as in male but less acuminate apically, pronotum nearly transverse and antennae much shorter.

Length 11.2–15 mm.; width 2.6–3.5 mm.

Holotype.—Female; Davao, Mindanao; (Dr. Platen) [ANSP number 8257].

Allotype.—Female; Kolambugan, Mindanao; (Baker) [USNM].

Paratypes.—Male, female; Saub Cotobalo, Mindanao, P. I., 1921 (E. H. Taylor) [KU]. Male; Samar (Baker) [USNM]. Male, female; Sugigao, Mindanao (Baker) [USNM]. 29 males, 22 females; Kabasalan Zamboanga, January, April, May 1932 (H. C. Muzzal) [CAS]. Female; Silipon Buk, May 18, 1932 (L. Phillips) [CAS]. 2 females; Lawa, Davao Prov. [CNHM]. Male; Island Samar (Baker) [USNM]. Male, female; Kolambugan, Mindanao (Baker) [USNM]. Female; Ile, Basilan, Mindanao [MRHNB].

Olenecamptus bilobus luzonensis new subspecies (Pl. X, fig. 6.)

Closely approximates the nymotypic form in basic pubescent coloration but differs as follows: the basal macula is not bilobed, only slightly emarginate at the middle of posterior margin (as in *strucki*) and encircles the apex of the scutellum as in the latter; however, the small macula between the basal and humeral, found in both *mindanaensis* and *ternatus,* is present; the humeral macula is as that in *ternatus.* The truncation of the elytral apex is less oblique than in *strucki, ternatus,* or *mindanaensis* and is not dentate at tip.

Length 14 mm.; width 3 mm.

Holotype.—Male; Manila, P. I. (A. Vaughn) [AMNH].

Allotype.—Female; Subig Bay, Luzon Is., Philippine Is., May (J. C. Thompson) [CAS].

Paratype.—Male; Agr. College, Laguna, P. I., May 1, 1931 (F. C. Haddon) [CAS]. Male, female; Mt. Makiling, Luzon (Baker) [USNM].

Olenecamptus bilobus lacteoguttatus Fairmaire (Pl. X, fig. 7.)

1881. *Olenecamptus lacteoguttatus* Fairmaire, Naturaliste, III, p. 359.
1940. *Olenecamptus bilobus* Fabricius. Breuning, Nov. Ent., suppl. 3, I, p. 554.

Female. Differs from the nymotypic form in having the basal quarter of the elytra white pubescent; the bilobed basal macula with each lobe emarginate feebly on posterior margin and has two discal maculae on each elytron as in *b. nipponensis,* in which the hind spot is larger than the anterior.

Length 17 mm.; width 4 mm.

Type locality: Ruk, Carolina Islands.

Distribution.—Carolina Islands and Marianas Islands.

Marianas Islands: 2♂, ♀; Saipan I., July 19, 1945 (E. Hagen) [CAS]. Caroline Islands: ♀; Dublon, Truk, April 7, 1936 (Z. Ono) [BM].

Olenecamptus bilobus nipponensis new subspecies (Pl. X, fig. 8.)

1933. *Olenecamptus bilobus* Fabricius. Matsushita, Journ. Fac. Agr. Hokk., XXXIV, p. 352.

Male. Differs from *bilobus luzonensis* which it most closely resembles in having the posterior margin of the postscutellar macula not notched medially; the anterior discal macula is much smaller in proportion to the posterior macula; also the antennae and legs are more reddish particularly in the Japanese specimen. The example from Loo Choo has a very slight emargination of the posterior margin of the postscutellar macula suggesting that the Loo Choo group might be an intermediate form between the Japanese and Luzon forms.

Length 8.5–10 mm.; width 3–3.7 mm.

Holotype.—Female; Japan: Ishigaki, May 1910 (J. C. Thompson) [CAS].

Allotype.—Male; Iriomote Is., July 20, 1934 (L. Gressitt) [CAS].

Paratypes.—Female; Riu Kiu Is. 1♀; Okinawa, October 4, 1931 [CAS]. Male; Japan [RNHL].

Olenecamptus bilobus taiwanus new subspecies (Pl. X, fig. 9.)

1925. *Olenecamptus bilobus* Fabricius. Schwarzer, Ent. Blätt, XXI, p. 64.

Body color darker and general pubescence much grayer than in the typical form; postscutellar macula smaller, usually completely divided, not attaining the scutellum; small macula at basal quarter oval rather than round; humeral macula is nearly identical to that in the typical form but is narrower; the pubescence beneath is grayer. The elytral apices are the same but not dentate at tip.

Length 12–17.5 mm.; width 2.5–4 mm.

Holotype.—Male; Formosa (Sauter) [AMNH].

Allotype.—Female; Kuraru, Formosa, Aug. 10, 1934 (L. Gressitt) [L. Lacey].

Paratypes.—All Formosa: male, 2 females; Kosempo, 1909, 1911 (H. Sauter) [USNM—2 females; MRHNB—male]. 2 females; Kuraru, June–July 1932 (L. Gressitt) [L. Lacey]. 4 males; Kuraru, May–August (L. Gressitt) [CAS]. 2 males, female; Takan [MCZ—male, female; RNS—male]. Male; Kisan, June 4, 1932 (Y, Yans) [USNM]. Other material: 4 males; Hongkong [CAS—3; BMNH—1].

Remarks.—The Hongkong examples are transitional toward *tonkinus.*

Olenecamptus bilobus tonkinus new subspecies (Pl. X, fig. 12.)

Resembles typical form in surface and general pubescence color; the basal macula completely divided into two large, oval, more or less oblique maculae which do not touch the scutellum; the macula at the basal quarter is much larger than in *b. ternatus,* nearly equal in size to the one at apical third; truncation at apex less oblique and less strongly dentate at tip; elytra more strongly acuminate.

Length 12–19.5 mm.; width 2.8–4.5 mm.

Holotype.—Male; Tonkin, Choganh (L. Duport) [USNM].

Paratype.—Male; Tonkin, Hoa-Binh (A. de Cooman) [CAS].

Olenecamptus bilobus laosus new subspecies (Pl. X, figs. 10, 11.)

Darker in general surface and pubescence color than *tonkinus;* the common basal macula completely divided into two oblique, ovate or quadrate maculae which do not attain scutellum; the humeral macula as in *b. ternatus;* the two maculae on each elytral disk small, subequal to the scutellum in size, occasionally larger; elytral apex as in *b. ternatus.*

Length 12 mm.; width 2.5 mm.

Holotype.—Male; Laos, Northern Siam [ANSP number 8252].

Allotype.—Female; Rangoon, Burma [BMNH].

Paratypes.—Burma: Male; Rangoon, May 1938 (F. J. Meggitt) [CAS]. 2 males; Rangoon [BMNH]. Female; Rangoon, May, June, 1927 (F. J. Meggitt) [USNM]. Straits Settlements: 2 males; Singapore [BMNH]. 2 males; Malacca [MCZ]. Federated Malay States: Male; Tapan, Perak; (H. N. Ridley) [BMNH]. Male; Saigon, Cochin China [MRHNB]. Female; Bhamo, Burma [MRHNB].

Remarks.—The specimen from Laos has both the elytral discal spots larger than the others; those of the Malay Peninsula are the smallest, on the Perak and Malacca examples the hind ones being nearly absent, thus approaching *borneensis.*

A specimen labelled Malacca in the Leyden Museum has the postscutellar spot common, very large, nearly reaching to basal quarter of elytra, the postmedian discal spot is rather large and transverse; the elytral apices are not dentate.

Olenecamptus bilobus borneensis Pic (Pl. X, figs. 13, 14.)

1916. *Olenecamptus borneensis* Pic, Mél. Exot. Ent., XVII, p. 6. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 555.

1916. *Olenecamptus Rouyeri* Pic, Mél. Exot. Ent., XVII, p. 6. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 555.

Body color medium reddish-brown, covered with gray or grayish-yellow pubescence; elytra with common basal macula transverse, usually not attaining scutellum, sometimes completely divided to form two distinct maculae; disk with a small rounded macula at basal third, about size of scutellum, the usual apical one typically completely wanting, sometimes present but very minute; humeral macula as in *b. ternatus;* apices of elytra with the truncature smaller, the external angle distinctly dentate.

Length 11–19 mm.; width 2.5–4.3 mm.

Type locality: Borneo (*borneensis*); Java (*rouyeri*).

Distribution.—Throughout the Sunda Islands.

ALOR: ♂; no locality data [RNHL]. FLORES: ♂; no locality data [BMNH]. SOEMBA: ♂, ♀; Waingapoe [RNHL]. JAVA: ♂; Palabuan, Central Java (Fruhstorfer) [ANSP]. ♀; Sukubumi, West Java, 2000 ft. [ANSP]. ♀; Kediri [BMNH]. 2♂; Pradjekan [MCZ]. ♂, ♀; no locality data [MCZ]. ♀; Bandoeng, 1925 (Van Roon) [USNM]. ♂; no locality data [MRHNB]. ♂; Soekaboemi [MRHNB].

SUMATRA: 2♂; Bak Lias (Mjöberg) [RNS]. ♂; Propoe R., Padang Highlands, 1600 ft. [USNM]. ♀; Goenoeng-Agoeng, Mt. Dempo, Palem-

bang, 4500 ft., August [ANSP]. ♂; Medan-Deli, 300 ft., June [ANSP]. BANGKA: 3♂, ♀; no locality data [RNHL]. RIOUW ARCHIPELAGO: 2♂; Bintang [RNHL]. BORNEO: 10♂, 4♀; Brunei [ANSP; USNM; CNHM]. ♀; Kuching [BMNH]. ♀; Long Navang [RNS]. ♂; Mt. Tibang, 1400 m. (Mjöberg) [RNS]. ♀; Brit. N. Borneo [BMNH]. ♀; Teiok Ayer, West Borneo, Aug. 1907 [CAS]. 2♀; Sandakan (Baker) [USNM]. ♀; Sarawak, 1865–66 (X. G. Doria) [MRHNB]. 2♂, ♀; Simpang [MRHNB]. ♂; Pontianak (Holl.) [MRHNB].

BOENGOERAN IS.: ♂, 3♀ [RNHL].

Remarks.—The Borneo specimens are transitional forms between the typical Javan population and *laosus;* all degrees of variation between the two can be found in a sizable series.

The single specimen from Flores has the common basal macula of elytra notched anteriorly and posteriorly at middle and the macula on basal third of disk is larger than in Javan examples.

On Borneo, too, are found examples of *b. strucki* for which see under the description of that form.

Olenecamptus bilobus artemis new subspecies (Pl. X, fig. 21.)

Most closely allied to *b. borneensis* Pic but the common basal macula elliptically bilobed and each lobe oblique; the small macula at basal third equal or even smaller in size than the macula at apical third, the latter always present, not absent as is sometimes the case in the aforementioned subspecies.

Length 12.5–16 mm.; width 2.6–3.6 mm.

Holotype.—Male; Andaman Isl. [MRHNB].

Allotype.—Female; topotypic [MRHNB].

Paratypes.—6 males; topotypic [MRHNB—2 males; RNHL—4 males].

Olenecamptus bilobus niasus new subspecies (Pl. X, fig. 15.)

Similar to *b. laosus;* the elytra, however, have the postscutellar macula always single, deeply lobed, each lobe subquadrate, not oblique, the discal maculae larger, always distinctly larger than the scutellum; elytral apex strongly obliquely truncate, the external angle produced into a short tooth.

Length 15–16 mm.; width 3.5 mm.

Holotype.—Male; Kalim Bungo, Central Nias, June–Nov. 1894 (R. Mitschke) [ANSP number 8253].

Paratypes.—2 males; same data as holotype [ANSP]. Male; Nias Island [RNS].

Olenecamptus bilobus pseudoserratus new subspecies (Pl. X, fig. 16.)

Resembles *b. quinquemaculatus* in the dark body coloration and in possessing a similar extra macula on the elytra, but agrees otherwise with *b. indianus.* From the latter, moreover, it disagrees in having the postscutellar macula feebly notched posteriorly at suture, the lobes never emarginate behind nor separated.

Length 10–17 mm.; width 2–3.5 mm.

Holotype.—Waddowa, Ceylon, March–June [ANSP number 8255].

Paratypes.—2 males; Ceylon [BMNH; MCZ]. Male; Kandy, Ceylon [BMNH].

Olenecamptus bilobus indianus Thomson (Pl. X, figs. 17, 18.)

1857. *Authades indianus* Thomson, Arch. Ent., 1, p. 192.
1860. *Authades bilobus* Fabricius. Thomson, Class. Ceramb., p. 108.

Very similar to *b. niasus,* but distinct especially in the postscutellar macula being much larger and with a process anteriorly which attains the scutellum; as in this other form, the hind discal elytral macula is larger than the anterior and both are usually larger than the scutellum. In the seven typical examples on hand the body color is quite pale.

Length 9.5–18 mm.; width 2.1–3.5 mm.

Type locality: India.

Distribution.—Over most of British India and on the Seychelles Islands.

India: ♂, 3 ♀; Dehra Dun, U. P., April, May [USNM—♀; CAS—♂, 2 ♀]. ♀; Nilgiri Hills [BMNH]. ♀; Cannanore, Madras [CAS]. ♀; Mysore [BMNH]. ♀; Nowatoli, Chota-Naghpor [BMNH]. 4 ♂; Chandkhiva, Sylhet [RNS—1; ANSP—3]. ♀; Calcutta [MCZ]. ♀; Mangalore, June, 1926 (J. C. Birdweel) [USNM]. ♂, ♀; Malabar [MRHNB].

Seychelles Islands: 2 ♀; no locality data [BMNH; RNS].

Hosts.—Reared from *Ficus glomerata* and from "an unknown climber."

Variations.—Nearly half the specimens above have some of the markings reduced, the postscutellar macula is completely divided,

each portion being ovate, often oblique. As in some cases both extremes were collected on exactly the same date and at identical localities, a name for this variety was felt to be undesirable.

In Assam representatives of both the present and the following forms are found.

The two specimens from the Seychelles Islands differ more greatly between themselves than with this present form; it is impossible to state, therefore, whether they eventually will prove to be distinct. Possibly they have been accidentally introduced into the islands from India.

Olenecamptus bilobus quinquemaculatus Breuning (Pl. X, fig. 19.)

1940. *Olenecamptus bilobus* m. *quinquemaculatus* Breuning, Nov. Ent., suppl. 3, I, p. 555, fig. 568.

Distinct from *b. indianus* particularly in the darker body coloration and in possessing an additional macula on the elytra. This macula is common to both elytra and is located on the suture caudad of the posterior discal maculae and is about as large as the scutellum; rarely this is obsolete or absent. In addition, the other maculae are much larger than in *indianus,* that behind the scutellum is usually completely divided into two narrowly separated (sometimes broadly contiguous), elongate, ovate lobes, sometimes prolonged basad to the scutellum.

Length 11–17 mm.; width 2.5–4 mm.

Type locality: Sikkim.

Distribution.—Northern India.

INDIA: ♂, 4♀; British Bhutan [BMNH]. ♂; Maria Basti; British Bhutan [RNHL]. ♀; Rangagora, Dibrugarh (Plains), Up. Assam [BMNH]. 4♀; Chandkhiva, Sylhet [ANSP]. ♀; Sylhet Dt., Assam [CAS]. ♀; Darjeeling [RNHL].

Note.—One male labelled "Pangtiac, Laos, May 14, 1918, (R. Vitalis de Salvaga)" in MRHNB agrees perfectly with this subspecies; the authors question the locality data.

Olenecamptus bilobus gressitti new subspecies (Pl. X, fig. 20.)

1938. *Olenecamptus bilobus* Fabricius. Gressitt, Lingnan Sci. Journ., XVII, p. 158.

Above pale as in *b. indianus,* the elytral maculae even larger than in *b. quinquemaculatus,* the posterior discal ones distinctly larger than the postscu-

tellar; the latter completely divided into two broad ovate maculae, just attaining the scutellum, the anterior discal maculae about half length of postscutellar, all strongly outlined with brown. The undersurface is nearly black, more sparsely white tomentose; the abdomen with black maculae on sides, large on first several sternites.

Length 12 mm.; width 2.8 mm.

Holotype.—Male; Suifu, Szechwan, China, Oct. 1930 [USNM].

Named for Dr. J. Linsley Gressitt who has contributed so very much to the knowledge of Asiatic Cerambycidae.

Olenecamptus bilobus trimaculatus Breuning

1940. *Olenecamptus bilobus* m. *trimaculata* Breuning, Nov. Ent., suppl. 3, 1, p. 555, fig. 565.

Distinct in having the usual common postscutellar macula divided into three parts, the median part very small, elongate; the lateral portions rounded; the elytra, moreover, have the premedian macula nearly wanting.

Type.—Male in Itzinger collection.

Type locality: Seychelles Islands.

This form was not seen by the present authors; it could possibly represent the subspecies actually native to the islands. The two specimens from this locality seen by the authors are not readily distinguishable from *b. indianus* (under which name they are listed here) and certainly in no way agree with the above.

Olenecamptus madecassus Pic

1901. *Olenecamptus madecassus* Pic, Revue d'Ent., xx, p. 226.
1940. *Olenecamptus bilobus madecassa* Pic. Breuning, Nov. Ent., suppl. 3, 1, p. 554.

"Elongate, subparallel, moderately convex, fusco-piceous, densely covered with tawny pubescence; on head and prothorax diluted; elytra each trimaculate, first macula subbasal, behind scutellum, by suture narrowly separated from the other, larger, reddish, the other two smaller, white, first external before middle, second discoidal, behind middle, these three very narrowly annulate with piceous; beneath gray, sides of prothorax, genae, front, and labrum largely white, labrum at base on each side deeply foveate; antennae nude, piceous, two times body length, finely granulate, scape thick, white pubescent; prothorax nearly twice as long as wide, sides parallel, disk obsoletely, transplicate; basal sulcus strong, basal margin broadly arcuate, hind angle slightly retroverse, basal part denuded, and on each side a minute white macula; elytra oblong, attenuate apically, apices separately rounded, finely rugosely punctate, apical part with an ashy plaga prolonged externally; legs fuscous, finely white pruinose, front legs longer. 16 mm

Madagascar. Resembles *lacteoguttatus* Fairm. but the coloration is more pronounced, elytra are longer, less acuminate, the first two spots are separated, and scutellum is not white."

This species differs from *O. bilobus* and its subspecies by having the scutellum dark instead of white pubescent. The above is a translation of the original description.

Olenecamptus confluens Breuning

1940. *Olenecamptus bilobus* m. *confluens* Breuning, Nov. Ent., suppl. 3, I, p. 556, fig. 570.

"As m. *dahli* Kriesche but the postmedian united anteriorly with the bilobed spot and often also with the lateral posthumeral.

"*Type*, a ♂ from New Britain, in Museum of Paris. It occurs with *dahli*." (A translation of the original description.)

Remarks.—This form does not appear to the present writers to belong as a form of *bilobus* but seems most certainly to be a distinct species. A letter to the Paris Museum asking for further information concerning the type did not bring any response.

Olenecamptus detzneri Kriesche (Pl. XIII, fig. 4.)

1926. *Olenecamptus detzneri* Kriesche, Stett. Ent. Zeit., LXXXVII, Nov., p. 376. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 556, fig. 572.

1926. *Olenecamptus curvatomaculatus* Schwarzer, Senckenbergiana, VIII, Dec. 24, p. 288.

1940. *Olenecamptus detzneri* m. *curvatomaculata* Schwarzer. Breuning, Nov. Ent., suppl. 3, I, p. 556.

Very distinct from *O. bilobus* in the black or piceous integumental coloration (including legs and antennae as well as rest of body) and in having an entire vitta each side of pronotal disk.

Male. Elongate-ovate, cylindrical, slender; entirely black or piceous, sparsely fuscous-gray pubescent, with white or yellowish tomentose markings as follows: head above behind each eye with a macula; sides entirely white. Pronotum each side with a narrow, entire vitta running between basal and apical margins, convergent posteriorly. Scutellum largely whitish. Elytra with a large common macula behind scutellum, notched at suture; on disk each with a long, arcuate vitta, often divided into two maculae, reaching from basal to apical quarters, anteriorly often connected with a subhumeral vitta; the latter is broad at base, then strongly constricted on apical three-fifths; at extreme base is an indistinct, whitish patch of pubescence. Body beneath black, abdomen dark reddish-brown, silky gray pubescent, more distinctly so laterally.

Head minutely alutaceous; front not asperate; antennal tubercles robust, armed at apex with a short, acute tooth. Pronotum one-fourth longer than wide; basal and apical transverse sulci deep, the latter arcuate medially; disk coarsely, transversely rugose. Scutellum rounded. Elytra with sides broadly arcuate; apices subacuminately rounded, nearly squarely truncate, unarmed; disk rather sparsely, coarsely punctate, punctures finer on apical half. Mesosternal process narrowly emarginate at apex; fifth sternite narrow, longer than fourth, apex broadly emarginate. Antennae about three times as long as body, the fifth segment strongly surpassing elytral apex, strongly serrate beneath from third to eleventh segments; scape reaching behind middle of vertex; third segment nearly five times as long as scape, fourth three-fifths as long, the first four segments densely asperate and serrate all over; segments five to seven gradually longer than fourth, eight to ten shorter, eleventh elongate, arcuate. Forelegs with tibiae and femora serrate beneath.

Female. More robust than male; pronotum as wide as long; elytra somewhat expanded behind and antennae and legs unarmed.

Length 12–19 mm.; width 2.5–4 mm.

Types in Berlin Museum (*detzneri*); Senckenberg Museum (*curvatomaculatus*).

Type locality: German New Guinea (*detzneri*); Bougainville Is. (*curvatomaculatus*).

Distribution.—Solomon Islands and New Guinea.

Solomon Islands: 2♂, ♀; Bougainville Islands, Sept. 1944 (L. F. Gunther, A. B. Gurney) [USNM]. ♂; Tulagi, Feb. 14, 1935 (R. A. Lever) [BMNH].

Remarks.—It may eventually prove that the Solomon Island representatives form a distinct subspecies but as no New Guinea specimens were on hand, this fact could not be determined here.

Olenecamptus hebridarum Breuning

1936. *Olenecamptus hebridarum* Breuning, Festschr. E. Strand, 1, p. 320; Nov. Ent., suppl. 3, 1, 1940, p. 556, fig. 573.

From Breuning's figure and brief descriptions and from notes kindly made for the authors by Dr. H. E. Hinton from the type series, the following has been garnered: distinct from *O. detzneri* in having the cuticle color reddish-brown, the head and pronotum fuscous; from both that species and *bilobus* it differs in having the pubescence of the underside of the body ochraceous and the pronotum with an ochraceous vitta each side of disk. The elytra have the common basal macula strongly transverse, the lobes dis-

tinctly oblique; there is only a postmedian discal macula present in addition (except perhaps below the humeri?). A translation of the original description follows:

"Near to *bilobus dahli* but: Vertex grooved. Pronotum very coarsely transversely rugose. Elytra more coarsely punctate. Front, genae, and sides of pronotum finely ochre-yellow tomentose; each side of pronotal disk a broad ochre vitta; the similar basal macula of elytra shorter and broader. Beneath everywhere ochre-yellow tomentose. Legs and antennae finely gray tomentose. 22 mm. Type ♂ from New Hebrides: Efate Island, in Brit. Mus."

Olenecamptus blairi Breuning (Pl. XIII, fig. 6.)

1936. *Olenecamptus blairi* Breuning, Festschr. E. Strand, 1, p. 320; Nov. Ent., suppl. 3, 1, 1940, p. 546.

Distinguished by the absence of the humeral maculae, and the presence of the four, small, elliptical, white maculae of the elytra; mesosternal process not elevated medially.

Male. Elongate-oblong, slender, cylindrical; entirely light reddish-brown, covered with fine, yellowish-gray pubescence, except abdomen, which is more densely gray pubescent. Elytra each with two, small, narrow, elliptical, white maculae, one at middle, the other at apical quarter.

Head above finely alutaceous; front sparsely asperate; antennal tubercles well-separated, at apex with a robust tooth; eye with lower lobe large, strongly widened posteriorly. Pronotum strongly elongate, widest at apex; apical and basal sulci deep, the basal one deeper, both feebly curved medially; entire disk transversely rugose. Elytra moderately attenuate to apices, which are obliquely truncate on sutural margin and obtusely dentate at tip; disk with moderate, well-spaced punctures, which are of equal size over entire disk. Mesosternal process not elevated medially, the apex angularly emarginate. Antennae with sixth segment attaining elytral apex (remaining segments missing); scape not quite reaching middle of head, strongly asperate dorsally; third segment nearly three and one-half times length of scape; fourth longer than fifth, remaining segments gradually shorter; finely densely asperate dorsally on third and fourth segments, finely serrate ventrally from third to seventh. Femora and tibiae sparsely finely serrate on inner edge.

Length 16 mm.; width 3.3 mm.

Type.—In British Museum (Natural History).

Type locality: British India: Chota-Nagpore, Nowatoli.

BRITISH INDIA: ♂; Chota-Nagpore, Nowatoli, May 6, 1896 [BMNH paratype].

Olenecamptus octomaculatus Breuning

1940. *Olenecamptus octomaculatus* Breuning, Nov. Ent., suppl. 3, 1, p. 545, fig. 540.

"Close to *indianus* Thomson, but antennae of ♀ twice length of body; front very finely punctate; pronotum as long as wide, rather strongly transversely strigate; elytra obliquely truncate at apex, their marginal angle distinct.

"Red; covered with fine red pubesence; a small ochraceous spot in emargination of eye; another similar at posterior margin of lower lobe and another similar on each side of the base of pronotum; scutellum ochraceous. On each elytron, eight rather small, very distinct, ochraceous spots: one posthumeral, round, very small, approaching side margins, one elongate behind scutellum, close to suture, two similar ones on disk at apical quarter (side by side), two similar behind middle (side by side; one approaching suture, the other discal), one other similar at apical quarter, approaching lateral margin, and the other preapical, round, on disk. An ochraceous spot on mesepisterna, an elongate similar band on metepisterna and another on sides of metasternum; a small yellow spot on sides of each abdominal sternite. Apices of antennal segments (beginning with third) infuscate.

"Length 20 mm.; width 4.5 mm. Type: a ♀ from Annam, in the Schall collection." (A translation of the original description.)

Olenecamptus dominus Thomson (Pl. XIII, fig. 13.)

1860. *Olenecamptus dominus* Thomson, Class. Ceramb., p. 362. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 547, fig. 543.

Resembles *O. compressipes* very closely in markings but the entire maculation is of dense white tomentum and the markings are vittiform rather than maculiform.

Male. Elongate-oblong, rather slender, cylindrical; dark reddish-brown, entirely covered with very thin, fine, gray pubescence; maculate with dense white tomentum as follows: head with a broad vitta behind lower lobe of eye, a narrow margin around lower lobe, and a semicircular macula on lower margin of front. Pronotum dorsally with three, obsolete, narrow vittae, one medially and one either side of middle, and with a broad one laterally which is very distinct. Scutellum with apical half white. Elytra each with four vittae, the sutural one extending around the scutellum, and broken into one or two elongate maculae behind apical third; the second is a series of very elongate maculae, joining the sutural vitta at the apex; the third vitta is broken into three parts, the first a geniculate macula on humerus, the second an elongate, diamond-shaped figure which extends nearly to apex, with its lateral margin at middle deeply emarginate; the third is a small, elongate macula at apex; the fourth vitta is a series of elongate dots to middle, thence to apex consisting of small, round dots. Beneath more heavily gray pubescent, the pronotal lateral vitta continued on meso- and metasternum, and on the

sternites, each sternite with a small, oblique, white macula inside of lateral vitta. Legs reddish-brown, femora darker, covered with thin, gray pubescence. (Antennae lacking.)

Head above alutaceous; front coarsely but sparsely asperate; eye with lower lobe large, strongly widened posteriorly; antennal tubercles subapproximate basally, at apex with a robust, subacute tooth. Pronotum distinctly elongate, widest just before basal sulcus, apex slightly wider than base; apical and basal sulci wide, deep, curved slightly medially; entire disk finely, regularly, transversely rugose. Scutellum transverse, sides and apex broadly arcuate. Elytra gradually attenuate to apices; apices at suture feebly, obliquely truncate with a short, robust tooth at tip; disk with well-spaced, deep punctures which become somewhat finer apically. Mesosternum anteriorly subtuberculate medially, process elevated medially and feebly widened apically, apex feebly emarginate. Profemora and tibiae rather densely serrate beneath.

Length 24.5 mm.; width 5.2 mm.

Type locality: "Camboje and Assam."

Distribution.—Cambodia and Assam.

FRENCH-INDO CHINA: ♂; Cambodia [BMNH].

Olenecamptus pseudostrigosus pseudostrigosus Breuning

(Pl. XIII, fig. 10.)

1937. *Olenecamptus pseudostrigosus* Breuning, Festschr. E. Strand, IV, p. 226; Nov. Ent., suppl. 3, I, 1940, p. 546.

While this species is very close to *dominus,* especially in its elongate body form, it is obviously distinct in having yellow markings instead of white ones. From *compressipes* which it resembles in the pattern of the elytra it is distinguished by its large, elongate body form. Furthermore, it differs from the latter as follows: pubescence of body above always very sparse, the derm shining through quite visibly even in fresh, unrubbed specimens. Head without vittae above. Elytra with anterior sutural vitta not nearly attaining scutellum; the marking just above the humerus at base elongate, vittiform. And body beneath with abdomen bivittate laterally, the vitta at extreme sides somewhat broader than the inner one, but both are narrow and widely separated; sternites not yellow marginate at apices. (In the subspecies *burmensis* the lateral vitta is very broad, but still the two members of the pair are entirely separated.)

Male. Elongate-oblong, slender, cylindrical; reddish-brown, sparsely gray pubescent; with yellow tomentose markings as follows: head with eyes outlined; front at base with a short, transverse line. Scutellum entirely tomen-

tose. Elytra with a basal sutural vitta widely removed from scutellum, short, its ends rounded, continued to near apex by a series of dots; at base above humerus is a short, curved vitta, rather broad, and somewhat constricted just behind its middle, continued by a series of dots to the premedian discal macula, which is variable in form, followed by another macula at apical quarter, somewhat smaller, and at apex a still smaller macula, between this series of markings and that of suture is a row of small dots (and sometimes fine vittae), this and the sutural series terminate in a macula that is always larger than that at apex, along sides a series of white dots. Body beneath dark brown to piceous with a fine vitta of yellow and white each side, on abdomen this is broken into two very fine vittae each side and is here yellow. Legs and antennae reddish-brown.

Head minutely alutaceous; front strongly asperate; antennal tubercles strongly dentate at apex. Pronotum one-third longer than wide; disk distinctly transversely rugose. Elytra elongate, gradually tapering; apices obliquely truncate from suture, the marginal angle slightly dentate; disk sparsely punctate. Fifth sternite a little longer than fourth, emarginate at apex. Forelegs strongly serrate beneath on femora and tibiae. Antennae one-half again as long as body, serrate beneath to seventh segment; third segment four times as long as first, the first four segments asperate above; fourth more than twice as long as first, rest gradually shorter, except eleventh which is longer than tenth.

Female. As male but pronotum only as long as wide; antennae and legs not serrate beneath, and fifth sternite as long as third and fourth together.

Length 21–25 mm.; width 4–4.5 mm.

Type in British Museum.

Type locality: Samsingh and Kalimpong, Bengal, India.

Distribution.—India.

India: ♀; no locality data [BMNH]. ♂; Pottcai Mts., Assam [BMNH]. ♂; Chandkiva, Sylhet [ANSP]. ♂; Kunbu [MRHNB].

Olenecamptus pseudostrigosus burmensis new subspecies

(Pl. XIII, fig. 11.)

Distinct from the nymotype in having a small macula on head at occiput each side of middle above; pronotum with a single small macula anteriorly and two equally small at base; elytra with the basal sutural vitta extending closer to scutellum, the postmedian discal about as large as premedian and the apical macula subvittiform; body beneath with the lateral vitta entirely white from eye to tip of abdomen, and less strongly divided on abdomen, the lateral portion very broad, comparatively speaking, the inner portion broken into small dashes.

Length 20–25 mm.; width 4.5–5 mm.

Holotype.—Female; Bhamo, Up. Burma, April, 1916; (F. M. Mackwood) [BMNH].

Paratype.—Female; Zibyaung, West Salween Div., Burma, May 2, 1922; from *Terminalia pyrifolia* [BMNH].

Olenecamptus pseudostrigosus didius new subspecies (Pl. XIII, fig. 12.)

Resembles the nymotype in lacking maculae on head above, but the pronotum is as in *burmensis*, having a small apical and two small basal maculae. The elytra have all the markings elongate and vittiform, the basal sutural vitta nearly attains scutellum and is quite long, extending behind basal one-third, the discal maculae are likewise notably elongate and vittiform. The body beneath is as in *burmensis* but the vittae incline to creamy white on the thorax, and are more subdivided on the abdomen than in that race, but less strongly so than in the typical form.

Length 25–27 mm.; width 5 mm.

Holotype.—Male; Tonkin [MRHNB].

Paratype.—Male; Laos [MRHNB].

Olenecamptus compressipes Fairmaire (Pl. XIII, fig. 9.)

1888. *Olenecamptus compressipes* Fairmaire, Ann. Soc. Ent. France, (6), VIII, p. 370. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 545.

Of all this group, this form has the densest, over-all gray pubescence, two converging vittae on head above, and beneath the lateral vitta encloses a dark brown macula on each sternite.

Female. Elongate-oblong, slender, cylindrical; dark reddish-brown, with dense grayish pubescence. Head with lower margin of front and margin of eyes, pale yellow pubescent; two maculae behind eye, and a vitta either side of middle on head above (these converge on vertex) yellowish-white or white. Pronotum laterally with a broad vitta, dorsally with four small elongate maculae (two at apex, one either side of middle, two basally, less widely separated than those at apex) of pale yellow or yellowish white pubescence. Scutellum, except extreme base, yellow pubescent. Elytra with four maculiform vittae, the sutural one with an elongate macula at base which partially encircles the scutellum and is darker yellow in color than the remaining part which is composed of one or two, narrow, elongate maculae and the remaining portion of small dots, the last of which does not attain the apex and is the largest of all the dots; the second vitta composed of small dots of pale yellow, with the exception of the macula which is at the extreme base and is much larger, this vitta extends to slightly beyond the middle; the third one begins just before middle with one or two small maculae, then a much larger macula at middle and one same size at apical third, then with several minute ones and a slightly larger one at apex, all of the darker yellow pubescence; the fourth vitta is extremely lateral and composed of many, small, pale yellow maculae. Beneath piceous, moderately densely gray pubescent, broadly pale yellow vittate laterally on sterna and

sternites, on each sternite the vitta enclosing a small, elongate, brownish macula. Legs dark reddish-brown, tibiae and tarsi paler, gray pubescent. Antennae with scape dark reddish-brown, remaining segments paler, except apices which are same color as scape; entirely thinly gray pubescent.

Head above alutaceous; front alutaceous and very sparsely asperate; eye with lower lobe moderately widened; antennal tubercles subapproximate basally, at apex with a short, robust tooth. Pronotum feebly transverse, slightly wider apically; apical and basal transverse sulcus broadly curved medially; disk feebly transversely rugose. Scutellum transverse, sides and apex broadly arcuate. Elytra somewhat widened behind middle; apices at suture obliquely truncate, at tip with obtuse tooth; disk basally with coarse punctures which become smaller apically; mesosternum basally with a feeble tubercle, process at apex deeply, angularly emarginate. Antennae with sixth segment attaining elytral apex (remaining segments missing); scape reaching just to middle of head, dorsally coarsely densely asperate; third segment more than three times length of first, feebly asperate at base; fourth slightly longer than fifth, remaining segments (to seventh) gradually shorter.

Length 15.7 mm.; width 3.5 mm.

Type locality: "Camboge, Indo-China."

Distribution.—French Indo-China and Siam.

SIAM: ♀; no locality data [BMNH].

Olenecamptus strigosus strigosus Pascoe (Pl. XIII, fig. 7.)

1866. *Olenecamptus strigosus* Pascoe, Trans. Ent. Soc. Lond., (3), III, p. 317. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 546 [ex parte].

1876. *Olenecamptus lineatus* Gestro, Ann. Mus. Civ. Stor. Nat. Genova, VIII, p. 521.

Resembles *compressipes* in having the elytral discal maculation yellow, but has the body subglabrous, and the elytral maculation is simpler.

Male. Elongate-ovate, rather slender, cylindrical; reddish-brown, elytra sometimes slightly paler; entirely covered with a thin, fine, grayish-yellow pubescence. Head above with two yellow vittae which converge on vertex, and a triangular macula of same color behind eye. Pronotum laterally with a vitta of yellow pubescence just above procoxae. Apical half of scutellum yellow. Elytra each with yellow markings as follows: a short, rather narrow sutural vitta at base, just attaining apex of scutellum, extending to basal third, on base near humerus a small, narrow macula, on disk a short, narrow, elongate macula at middle, which is widest posteriorly, and at apical third an elongate macula at suture; along lateral margin a row of minute maculae which are usually much interrupted. Beneath medium to light reddish-brown, all over yellowish-gray pubescent, with yellow markings as follows: mesosternal side-pieces maculate, a narrow vitta laterally on metepisterna and metasternum, sternites one to four with a small, elongate macula and

fifth sternite with one large macula either side enclosing two smaller, brownish ones. Legs and antennae light to medium reddish-brown, with thin, fine grayish-yellow pubescence; scape of antennae slightly darker, as are the apices of the other segments.

Head above alutaceous; front strongly, sparsely asperate; eye with lower lobe strongly widened posteriorly. Pronotum very elongate, feebly wider apically than basally; apical sulcus moderately deep, narrow, feebly curved medially, basal one deep, feebly curved medially; disk rather finely, transversely rugose. Scutellum transverse, sides and apex broadly arcuate. Elytra gradually attenuate to apices; apices feebly, obliquely truncate, not dentate at tip; surface with moderate-sized, deep, well-spaced punctures which become slightly finer towards apex. Mesosternal process feebly emarginate apically, mesosternum feebly elevated basally at middle. Antennae twice body length; scape reaching beyond middle of pronotum, strongly, densely asperate dorsally; third segment four times length of scape, finely asperate dorsally, finely serrate ventrally; fourth and fifth subequal, remaining segments shorter, except eleventh which is longer than tenth; fourth finely asperate dorsally, sparsely and finely serrate from fourth to seventh ventrally. Forelegs serrate on femora and tibiae on inner side.

Female. More robust, widened behind middle of elytra; front less strongly asperate; pronotum feebly elongate; protibiae only feebly serrate; antennae only serrate on scape and third.

Length 16–20.5 mm.; width 3.6–3.8 mm.

Type locality: Aru, Amboyna.

Distribution.—New Guinea, Aru, and Moluccas.

NEW GUINEA: ♀; Milne Bay [ANSP]. ♂, ♀; Mimika River (A. F. R. Wollaston) [BMNH]. ♀; Cyclops Mts., Sabron, 2000 ft., June 1936 (L. E. Cheeseman) [BMNH]. ♂; Humboldt Bay distr. (W. Stüber) [BMNH]. ♀; no locality data, 2500 ft., Oct. 30, 1944 (H. Hoogstvaal) [CAS]. ♀; Saidor, June 6–7, 1944 (K. V. Krombein) [USNM]. ♀; Dorey [MRHNB].

Remarks.—In the Milne Bay example the body color is somewhat paler, the basal sutural vitta of elytra encircles the scutellum; the post median macula is broader anteriorly, and the subhumeral line is obsolete.

Olenecamptus strigosus guadalcanalus new subspecies

(Pl. XIII, fig. 8.)

Lacks the following markings of the nymotypic form: the converging vittae on vertex of head (sometimes very faintly present), and the sutural macula of the apical quarter of elytra. The lateral vitta of the pronotum, mesosternum, and metasternum is also very feeble or lacking. The elytral macula behind middle is prolonged into a series of very small maculae to apex, the row of minute lateral maculae is distinct and regular, not interrupted as in typical form.

Length 13–15.5 mm.; width 3–4 mm.

Holotype.—Male; Guadalcanal Island, Solomon Islands, 1944 (L. N. Jarcho) [MCZ].

Allotype.—Female; same data as holotype [MCZ].

Paratypes.—Male, female; same data as holotype [MCZ].

Olenecamptus sandacanus Heller (Pl. XIII, fig. 17.)

1923. *Olenecamptus sandacanus* Heller, Tijd. Ent., LXVI, p. 38, pl. I, fig. 13.
1940. *Olenecamptus strigosus* Breuning [non Pascoe], Nov. Ent., suppl. 3, I, p. 546 [ex parte].

While this species is somewhat similar to *strigosus,* it is distinct in its glabrous appearance, lacks markings on head above, and the maculation of elytra is considerably more complex.

Male. Elongate-oblong, slender, cylindrical; dark reddish-brown, appearing to be nearly glabrous, but with very sparse, fine, grayish pubescence, and with pale to medium yellow markings as follows: front with a small semicircular macula either side of middle on lower margin and lower margin of eye, behind eye a short vitta, broadest anteriorly and constricted at middle, not attaining base of head, sometimes broken at constriction into two maculae. Pronotum with a fine, indistinct vitta above procoxae, this may be present only in part, broken into small dots, or even entirely absent. Scutellum at base without yellow pubescence. Elytra each with the following markings: near suture a narrow vitta composed of an elongate macula behind scutellum, attaining basal third of elytron, followed by a series of small maculae to near apical quarter, and ending in a larger, tear-drop-shaped macula which does not attain apex; a second vitta paralleling the first, beginning at the same distance from base of elytron, followed by a series of small maculae which only attain the apical quarter, a third broken vitta beginning at extreme base on inner side of humerus as a long, narrow oblique macula followed by several minute ones, then just before middle a large, elongate, triangular one, widest part posteriorly, followed just behind middle by another of same size and shape but less elongate, widest part anteriorly, then several very minute dots, and at apex a slightly larger, oval macula; lateral margin of elytra with a row of small, white maculae varying in length. Beneath reddish-brown, mesosternal side-pieces and metepisterna of the yellow pubescence, as is a narrow vitta on side of metasternum (this sometimes broken into dots); abdomen with two rows laterally of yellow maculae, the inner rows narrowest. Legs and antennae reddish-brown, very thinly clothed with fine gray pubescence.

Head above finely alutaceous; front finely, sparsely alutaceous; antennal tubercles subapproximate basally, at apex with a short, obtuse tooth. Pronotum elongate; apex feebly wider than base; apical sulcus more shallow than basal, curved medially, basal one straight; disk moderately transversely rugose. Scutellum transverse, sides and apex broadly arcuate. Elytra with

sides feebly attenuate, apices obliquely truncate, feebly obtusely dentate at apex; disk basally coarsely but not densely punctate, punctures becoming finer apically. Mesosternal process very feebly elevated medially, apex deeply emarginate. Protibiae and profemora serrate ventrally. Antennae about twice length of body, scape reaching to beyond middle of head, coarsely, densely rugose on dorsal surface; third segment nearly four times length of scape; fourth slightly longer than fifth, remaining segments gradually shorter, except eleventh, which is longer than tenth; third and fourth segments finely asperate, finely serrate ventrally from third through sixth.

Length 12.7–18.6 mm.; width 3–4.2 mm.

Type locality: Sandacan, North Borneo.

Distribution.—Borneo.

BORNEO: 4♂, 2♀; Sandacan, N. Borneo [ANSP—2♂, 2♀; USNM—2♂]. ♀; Pengaron, S.W. Borneo [ANSP].

Olenecamptus multinotatus Pic (Pl. XIII, fig. 15.)

1916. *Olenecamptus multinotatus* Pic, Bull. Soc. Ent. France, p. 141.
1926. *Olenecamptus salweeni* Heller, Tijd. Ent., LXIX, p. 39, pl. 5, fig. 7.
1940. *Olenecamptus indianus* Thomson. Breuning, Nov. Ent., suppl. 3, 1, p. 544.

The elytral and body markings in this species are white, a fact that will serve to distinguish it from *strigosus* which it otherwise resembles in general appearance.

Male. Elongate-oblong, rather slender, cylindrical; dark reddish-brown, elytra paler; entirely covered with a very thin, fine brownish-gray pubescence, with white (or yellowish-white) tomentose markings as follows: head above with a vitta either side of middle which converges on vertex (these vittae sometimes much broken or nearly entirely lacking), laterally behind eye with two small maculae; eye margined with white. Pronotum with four maculae above, two anteriorly, one either side of middle, sometimes very elongate, two basally nearer middle than anterior ones; laterally a broad vitta just above procoxae, the upper margin of which is sinuate. Scutellum entirely white except for basal angles. Elytra each with four macular vittae, first at suture, consisting of an oblong macula which does not attain the scutellum, thence continuing as very small maculae to apical quarter where there is a small macula about one-half the size of the basal one; the second vitta is composed of fine maculae which begin on basal quarter and end at apical third; the third vitta consists of a small elongate macula just before humerus at base, a few minute ones following, and before middle an elongate ovate one, widest posteriorly, then just behind middle another elongate-ovate macula with the narrowest end posteriorly, followed by several minute dots and at apex, a small round macula; the fourth vitta consists of a single row of very small dots along lateral margin. Beneath dark-reddish brown,

moderately densely, grayish pubescent, a broad lateral vitta extending from mesosternum to tip of abdomen, on each sternite the vitta encloses or nearly encloses a small, dark brown macula. Legs and antennae medium reddish-brown, thinly clothed with gray pubescence.

Head above alutaceous; front sparsely asperate; eye with lower lobe large, moderately widened posteriorly; antennal tubercles prominent, subapproximate basally, at apex dentate. Pronotum elongate; base and apex subequal in width, widest just before basal sulcus; apical and basal sulci wide and curved medially; entire disk rather finely transversely rugose, the rugae interrupted by an elongate callosity at middle. Scutellum transverse, sides and apex arcuate. Elytra feebly attenuate to apices, which are obliquely truncate from suture and not dentate; entire disk with large, well-spaced punctures. Mesosternum subtuberculate basally at middle, process at apex broadly, rather angularly emarginate. Profemora and protibiae dorsally sparsely asperate, ventrally serrate. Antennae about two times length of body with scape attaining middle of head, coarsely rather densely asperate dorsally; third segment nearly four times length of scape, fourth slightly longer than fifth, succeeding segments shorter except eleventh which is longer than tenth; third and fourth segments dorsally densely asperate, ventrally serrate, fifth, sixth, and seventh only very slightly asperate and serrate.

Female. More robust; antennae about two and one-half times body length only very feebly asperate on third and fourth segments, not serrate; protibiae and profemora not serrate; pronotum subquadrate or feebly transverse; elytra feebly widened behind middle.

Length 11–16.5 mm.; width 2.5–3.7 mm.

Type locality: "? Assam (or related region)" (*multinotatus*); Zibyaung, w. Salween, Burma (*salweeni*).

Distribution.—Burma and India.

India: ♂; Madras; (Dohon) [MCZ]. ♀; "(?) Maymyo, June 20 (H. L. Andrewes)" [BMNH]. ♀; Patkai Mts., Assam [Doherty] [BMNH]. Burma: ♀; Prome [BMNH]. ♀; Etat de Momeit, 600 m., 1890 (Doherty) [BMNH]. 2♀; N. China Hills [BMNH].

Remarks.—The maculation on the female from "(?) Maymyo" has the two larger median maculae of the third macular row joined, but in all other respects is the same as the others of this group. The vittae on head and pronotum are often broken and some parts lacking.

Olenecamptus albolineatus Pic (Pl. XIII, fig. 14.)

1916. *Olenecamptus albolineatus* Pic, Mél. Exot. Ent., xvii, p. 5.
1940. *Olenecamptus indianus* Thomson. Breuning, Nov. Ent., suppl. 3, i, p. 544.

Although this species is close to *O. multinotatus,* it is easily distinguished by the sutural vitta being much more elongate and acutely pointed on its posterior apex; the second row of elytral maculae is much more pronounced; and the white vittae on head above are abbreviated.

Male. Elongate-ovate, rather slender, cylindrical; medium reddish-brown, entirely covered with thin, fine, grayish pubescence, with white markings as follows: head above with a small macula either side of middle at occiput, and a small elongate one either side of middle, which converge on vertex; eye margined and a small macula either side of middle on lower margin of front; behind each eye two small maculae, the largest directly behind eye. Pronotum with a linear macula either side of middle at apex and with a small triangular one either side of middle basally; laterally a vitta which is widest at apex and base. Scutellum entirely white with basal angles brown. Elytra each with four macular vittae: one suturally, the basal macula elongate, attenuate apically, attaining basal third, then a series of elongate, narrow maculae to apical quarter where there is a larger oval macula; the second consists of a series of a few elongate dots beginning at basal quarter and ending at middle of elytra; the third begins as a small elongate macula at humerus, then just before middle an elongate macula, rather large, which is widest posteriorly, behind middle another large macula which is widest anteriorly, and at apex an elongate macula which is widest posteriorly; the fourth vitta along lateral edge of elytra, very narrow, usually composed of many, very small, elongate maculae, sometimes the apical ones are coalesced. Beneath dark reddish-brown, thinly covered with grayish-brown pubescence, laterally with a moderately wide vitta of white, on metasternum the vitta divided by a brown one; and on each sternite the vitta widens apically; a row of small elongate maculae on inner edge of lateral vitta, one on each sternite. Antennae and legs reddish-brown, thinly clothed with brownish-gray pubescence; antennae paler apically.

Head above alutaceous; front coarsely, sparsely asperate; eye with lower lobe large, strongly widened posteriorly; antennal tubercles prominent, somewhat separated basally, at apex with a short, subacute tooth. Pronotum elongate, slightly narrower apically than at base, widest just before basal sulcus; basal and apical sulci broad and deep, both curved medially; disk rather finely, feebly transversely rugose. Scutellum transverse, sides and apex arcuate. Elytra feebly attenuate; apices feebly, obliquely truncate, but not dentate at tip; entire disk moderately densely punctate, punctures slightly finer apically. Mesosternal process very feebly elevated medially, at apex rather deeply emarginate. Profemora and protibiae feebly serrate. Antennae twice body length; scape reaching beyond middle of pronotum, coarsely, rather densely asperate dorsally; third segment nearly four times length of scape; fourth slightly longer than fifth; remaining segments gradually shorter, except eleventh which is longer than tenth; third and fourth

segments densely, finely asperate dorsally; from third through seventh segments serrate ventrally.

Length 13.5–15.2 mm.; width 2.7–3.3 mm.

Type locality: Cochin China.

Distribution.—French Indo-China.

French Indo-China: 2♂; Cochin China [MCZ]. ♀; Vim Pullha, Upper Mekong, May 3, 1918 [MRHNB]. ♂; Vimtinue, Laos, May 15 [MRHNB]. ♂; Rampong Kedey, Rampong Prov., Cambodia [MRHNB]. ♀; Cape St. Jacques, Cochin China [MRHNB]. ♀; Saigon [MRHNB].

Olenecamptus malayensis new species (Pl. XIII, fig. 16.)

Resembles *O. dominus* Thomson but the color of the maculae and vittae is golden yellow, except the lateral vitta of elytra which is white; the third vitta is broken completely just behind the middle of the elytra; the head is vittate above; and the basal macula of the third vitta is not geniculate; the lateral vittae on the abdomen nearly enclose a dark brown macula; antennal tubercles less approximate.

Female. Elongate-ovate, rather slender, cylindrical; medium reddish-brown, elytra paler, entirely covered with a thin, gray pubescence, and with golden-yellow markings as follows: head above with a vitta either side of middle, the two converging on vertex; eyes outlined and a small macula either side of middle on lower edge of front; laterally a vitta which is widest behind eye and narrowest medially. Pronotum with a vitta either side of middle, tending to converge (but not quite) at base, laterally a broad vitta (continuation of lateral one on head) which is slightly narrower medially. Scutellum entirely yellow except for basal angles. Elytra with four vittae or macular vittae, one sutural, with a very elongate macula (widest basally) reaching to behind middle, then a series of very small dots ending in a larger elongate macula just before apex; second consisting of two or three tiny dots, a slender linear macula (not quite as long as the basal portion of sutural vitta) and then one or two dots; this vitta does not attain base and ends just behind the middle of the elytra; the third consists of a linear macula just before humerus, a few very small maculae, then a large, elongate macula (widest distally) at middle, then behind middle one of about equal size (widest basally) and one or two elongate dots, and at apex one slightly larger; the fourth row consists of a few elongate maculae or many tiny ones and is entirely white. Beneath dark reddish-brown, thinly clothed with gray pubescence, laterally a broad yellow vitta which on the abdomen encloses or nearly encloses a dark brown macula on each sternite. Legs and antennae medium reddish-brown, scape and third segment of antennae darker, all thinly clothed with gray pubescence.

Head above alutaceous; front feebly, sparsely asperate; eye with lower lobe large, rather strongly widened posteriorly; antennal tubercles prominent, subapproximate basally, apically moderately dentate. Pronotum subquadrate; apex slightly wider than base; apical sulcus rather shallow and strongly curved medially, basal one deeper, feebly curved medially; disk rather feebly, transversely rugose medially. Scutellum transverse, sides and apex arcuate. Elytra feebly widened at middle; apex obliquely truncate at suture, outer angle obtusely dentate; surface with moderate, well-spaced punctures; mesosternal process very feebly elevated medially, apex deeply emarginate; fifth sternite very deeply emarginate at apex. Antennae with eighth segment attaining elytral apex (only nine segments present); scape not attaining middle of head strongly asperate; third segment more than three times length of scape, feebly asperate, fourth longer than fifth, remaining segments gradually shorter.

Length 14.5 mm.; width 3.2 mm.

Holotype.—Female, Malay Peninsula, May 5, 1901 [BMNH].

Olenecamptus tagalus tagalus Heller (Pl. XIV, fig. 14.)

1923. *Olenecamptus tagalus* Heller, Tijd. Ent., LXVI, p. 38, pl. 1, fig. 4. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 545.

"Reddish-fuscous with white tomentum as follows: vertex with two lines, posteriorly divergent, two maculae behind eyes, prothorax on disk with two fine lines, basally and apically dilated, a supracoxal vitta, scutellum, each elytron apically squarely truncate, with a subsutural line on basal third, a punctiform macula in intrahumeral impression, a discal gutta before and behind middle, another smaller, subsutural, before apex, a marginal series formed of minute punctures and body beneath with a lateral vitta and sublateral-marginal line on metasternum. Front rather strongly punctate, elytra rather crebrosely and minutely punctate, apically obsoletely so, apices subtruncate.

"Length 18 mm.; width 3.5 mm. Luzon: Mt. Makiling."

"Close to *strigosus* Pasc., which is unknown to me."

From the above translation of the original description and from Heller's figure, it appears that this species is distinct from *strigosus* in having white markings and in having a pair of vittae anteriorly on pronotum.

Olenecamptus tagalus zamboanga new subspecies (Pl. XIV, fig. 15.)

Differs from the typical form as illustrated by Heller in the following: pronotum without trace of white vittae on disk, the two basal maculae obsolete or wanting. Elytra with the premedian discal vitta reduced to a large dot and the postmedian one only

slightly longer than it, the preapical sutural vitta likewise is reduced and the apical macula is entirely wanting.

Length 12.5 mm.; width 2.8–3 mm.

Holotype.—Male; Kabasalan, Zamboanga, Mindanao, P. I., May 1, 1932 (H. C. Muzzall) [CAS].

Paratype.—Male; same data as type [CAS].

Olenecamptus clarus clarus Pascoe (Pl. XIV, fig. 1.)

1859. *Olenecamptus clarus* Pascoe, Trans. Ent. Soc. Lond., (2), v, p. 44. Savio, Nat. Ent. Chin., II, 1929, p. 1, fig. 1. Matsushita, Journ. Fac. Ag. Hokkaido Imp. U., XXXIV, 1933, p. 352. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 550, fig. 577.

Resembles *nigromaculatus* but has antennae and legs much paler than body; elytral apices dentate and obliquely truncate to suture; and the body size is smaller.

Male. Elongate-oblong, rather slender, cylindrical; black or piceous. Entirely clothed with dense, white tomentum and with black markings as follows: head at base with three, short, elongate, black maculae, one medially and one either side behind isthmus of eye. Pronotum with a median vitta (broken into three maculae, one at apex small, middle one elongate, and basal one small and closer to center macula), laterally each side with two, small, black maculae. Each elytron with four black maculae, one on humerus, elongate, and three smaller on disk placed as follows: one at basal quarter, smallest and rounded, one just behind middle rounded, slightly larger, third on apical quarter, largest, and more or less oval. Beneath black or piceous, moderately densely, white pubescent, toward middle sometimes slightly yellowed; metasternum and each sternite with a single, rounded, rather small, black macula either side. Legs and antennae reddish-brown, the antennae paler apically; legs moderately, the antennae more thinly, clothed with white pubescence.

Head above alutaceous; front moderately rugose, with a few asperities; eye with lower lobe strongly widened posteriorly; antennal tubercles basally not widely separated, with a very short, robust tooth at apex. Pronotum elongate; apex and base subequal in width; apical and basal sulci wide but only moderately deep, disk medially finely, transversely rugose. Scutellum transverse, sides and apex broadly arcuate. Elytra with sides nearly parallel to apical quarter, then suddenly attenuate to apices, which are very feebly, obliquely truncate, with a short, feeble tooth at tip; entire surface very finely, densely punctate. Mesosternal process elevated medially, deeply, angularly emarginate at apex; fifth sternite subtruncate at tip. Antennae about two and one-half times length of body; scape reaching to middle of head, coarsely, not densely asperate on dorsal surface; third segment four

times length of scape, moderately asperate; remaining segments nearly subequal, except eleventh, which is distinctly longer.

Female. More robust; elytra widened somewhat behind middle, legs shorter, tarsi less heavily fringed; fifth sternite with median impressed line and emarginate at apex; antennae two times body length.

Length 11.5–14.7 mm.; width 2.5–3.3 mm.

Type locality: China borealis.

Distribution.—China and Japan.

CHINA: 2♂; no locality data [BMNH]. ♂, ♀; Nanking, June 25, 1923 (E. C. Van Dyke) [CAS]. ♂, ♀; Zi-ka-wei, June 23–26 [CAS]. ♀; Southern Manchuria, Aug. 27, 1930 [BMNH]. ♂; Chinkiang, May 20, 1924 [CNHM]. ♀; Chekiang, July 4, 1919 (E. Sueuson) [CNHM].

JAPAN: ♀; Mitsukuri, July 25, 1915 [USNM].

Olenecamptus clarus subobliteratus Pic (Pl. XIV, fig. 2.)

1923. *Olenecamptus clarus* var. *subobliteratus* Pic, Mél. Exot. Ent., XL, p. 19.

1929. *Olenecamptus subobliteratus* Pic. Savio, Not. d'Ent. Chin., II, p. 7, fig. 5.

1940. *Olenecamptus clarus* m. *subobliteratus* Pic. Breuning, Nov. Ent., suppl. 3, I, p. 558, fig. 578.

Male. Differs from the typical form in having a single, elongate, black macula at middle of pronotal disk, and in lacking the oval, black macula on apical quarter of elytra, and that on the metasternum and fifth sternite; the undersurface is less densely white pubescent; the truncature of the elytral apices is more strongly oblique.

Length 13–17 mm.; width 2.7–3.5 mm.

CHINA: ♂, ♀; Nanking, June 20–23, 1920 (E. C. Van Dyke) [CAS]. ♂; Chekiang, June 9, 1918 (E. Sueuson) [CNHM].

KOREA: ♂; Chemulpo, 1911 (P. Oudst) [MRHNB].

Olenecamptus nigromaculatus Pic (Pl. XIV, fig. 3.)

1915. *Olenecamptus nigromaculatus* Pic, Échange, XXXI, p. 14; Mat. Étud. Longicornes, x, 1916, p. 14. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 559.

This species is very close to *clarus subobliteratus* in coloration. From it, it may be distinguished by its having the antennae and legs black, and elytra squarely truncate at apex, without trace of a tooth.

Male. Elongate-oblong, rather slender, cylindrical; black or piceous. Entirely densely ashy-gray pubescent; head with a narrow vitta (narrowest apically) behind each isthmus of eye, and a small, elongate, triangular macula at middle of base, black. Pronotum medially with a fine, black

vitta which does not attain base or apex and laterally (a continuation of that on head) another much wider, sometimes two, very small, round, black maculae either side of median vitta just in front of basal sulcus. Elytra with humeri and each disk with two, small, round maculae, black (one at middle of disk on basal quarter, the other at middle and slightly smaller than the anterior one). Beneath black, entirely clothed with ashy-gray pubescence. Legs piceous or black, clothed with ashy-gray pubescence, tarsi dark reddish-brown. Antennae piceous or dark reddish-brown, apex of scape paler, clothed with thin, fine, grayish pubescence.

Head with front finely granulate; eye with lower lobe strongly widened posteriorly, lower margin oblique; antennal tubercles well-separated, at apex armed with a robust tooth. Pronotum slightly elongate, base feebly wider than apex; basal and apical sulci wide, shallow, curved; disk finely transversely rugose; sides just before basal sulcus with a rounded tumid area. Scutellum transverse, sides and apex arcuate, apex depressed medially. Elytra feebly widened at apical quarter, apex truncate, not toothed at tip, surface minutely, densely punctate, with distant, shallow, coarse punctures. Prosternal process very narrow; fifth sternite moderately attenuate, apex subtruncate. Front legs with femora and tibiae strongly serrate. Antennae twice body length; scape reaching beyond middle of head, strongly asperate and slightly depressed above, slightly serrate below; third segment nearly five times length of scape, feebly asperate above; fourth slightly shorter than fifth but twice length of scape, remaining segments subequal, from seventh missing.

Female. More robust; fifth sternite broad, apex emarginate, at apex with a shallow transverse sulcus; profemora and protibiae not serrate; antennae twice body length, third segment less strongly asperate.

Length 12.5–17.2 mm.; width 2.5–4 mm.

Type locality: Tibet.

Distribution.—China.

China: 7♂, 16♀; Tibet prov. [AMNH]. ♂; Yunnan [MRHNB]. ♂; Triaunnatung, Tibet [MRHNB].

MACROCAMPTUS new genus

This genus is distinct from *Cylindrepomus* in its large and robust body form; the elytra emarginate and dentate at outer angle, the sutural margin strongly elevated on posterior quarter, and more declivous posteriorly; the antennae have the entire dorsal surface of scape convex, not impressed or sulcate as in *Cylindrepomus,* and the segments are not serrate beneath in male; and the abdomen is not tapering in the male but is parallel-sided from middle of first sternite to the apex of fifth.

Elongate-oblong, comparatively robust, cylindrical. Head with front transverse; eye with lower lobe with angle obtusely rounded anteriorly, widened posteriorly, anteriorly twice or more the height of gena; antennal tubercles separated at base, at apex with a short robust tooth in both sexes. Pronotum slightly elongate or subquadrate; disk finely transversely rugulose. Scutellum concave. Elytra widened posteriorly, especially in female; apices obliquely emarginate, dentate at outer angle; disk punctate, along suture on apical quarter tumid, posteriorly declivous. Mesosternal process rather broad, moderately elevated medially, emarginate at apex; abdomen parallel-sided to fourth segment, fifth sternite parallel-sided in male, longer than third and fourth combined, in female expanded, as long as third and fourth together. Legs elongate, subequal, slender, the hind ones feebly longer; femora pedunculate, slender; metatibiae serrate in male. Antennae twice as long as body in male, somewhat shorter in female; scape convex above, not sulcate basally; third segment more than six times as long as scape; fourth longer than fifth, eleventh slightly longer than tenth.

Genotype: *Cylindrepomus virgatus* Gahan.

Key to Species

Elytra each with a single broad white vitta, its outer margin incised behind middle.....*andamanicus*

Elytra each with three narrow white vittae, the median one interrupted behind middle.....*virgatus*

Macrocamptus virgatus Gahan (Pl. IX, fig. 21.)

1890. *Cylindrepomus virgatus* Gahan, Ann. Mag. Nat. Hist. (6), v, p. 61. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 538, fig. 526.

Easily recognized by the elytra each possessing three vittae, the median one of which is interrupted behind center. The male has the profemora and all tibiae serrate beneath, and, like *andamanicus*, is notable for its relatively broad form.

Male. Elongate-oblong, cylindrical, rather robust; piceous, densely fuscous pubescent, vittate with white or pale yellowish-gray as follows: head with a vitta each side of middle converging anteriorly and continuing partially around antennal tubercles, a broader one behind eye and another on genae; front vittate transversely above mouth and on side margins. Pronotum trivittate above; above coxae with a broader stripe. Scutellum briefly spotted at apex. Elytra each with three vittae, conjoined at apex, narrowly separated at basal margin, the median one briefly interrupted behind middle, none sutural. Body beneath ashy pubescent medially, broadly white laterally, the sutures dark. Legs and antennae yellowish-brown or dark brown, the latter darker apically.

Head above and front finely alutaceous, the latter finely, very sparsely asperate; antennal tubercles well separated at base, strongly divergent apically, apex feebly, obtusely toothed. Pronotum elongate, slightly wider basally than at apex; deeply constricted basally by transverse sulcus, apical sulcus wide but deep, sides just before basal sulcus tumid; disk finely, transversely rugulose. Scutellum transverse, sides feebly arcuate, apex broadly rounded. Elytra broad with sides nearly parallel; apices broadly emarginate, with an obtuse tooth at sutural angle and a robust short tooth at outer angle; disk coarsely punctate, punctures somewhat finer apically, vittae rather strongly impressed. Mesosternal process feebly elevated medially, apex angularly emarginate. Fifth sternite deeply, broadly emarginate at apex. Profemora and all tibiae serrate ventrally. Antennae about twice body length; scape reaching slightly beyond middle of head, strongly asperate dorsally; third segment more than six times length of scape, fourth longer than fifth, remaining segments gradually shorter, except eleventh, which is distinctly longer than tenth; above strongly asperate on third and fourth segments, slightly on fifth and following; serrate beneath from third to ninth.

Female. More robust; elytra feebly but distinctly widened behind middle; fifth sternite broad, very shortly emarginate medially, legs not serrate ventrally; antennae about one and three-fourths times length of body, third segment feebly asperate basally, and not serrate, remainder not serrate nor asperate.

Length 14–21.5 mm.; width 3–4.5 mm.

Type locality: Himalayas, India.

Distribution.—India.

India: ♀; Sikim. ♀; Patkai Mts., Assam (Doherty). Both in BMNH. French Indo-China: Laos: ♂; Pang Eiae, May 14, 1918 (R. Vitalis de Salvaza); ♀; Traunint (Vitalis); both in MRHNB.

Macrocamptus adamanicus Gardner (Pl. IX, fig. 22.)

Cylindrepomus adamanicus Gardner, Ind. For. Rec., xiv, (7), p. 158, fig. 2. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 538, fig. 525.

This can be distinguished from all the species of *Cylindrepomus,* as well as from *virgatus,* in having a single broad white vitta on middle of disk of each elytron. The male has all the tibiae serrate.

Male. Elongate-oblong, rather slender, cylindrical; dark reddish-brown to piceous, dark brown pubescent, and with dense, white or yellowish-white tomentose markings as follows: head above with a rather broad vitta either side of middle which converges about middle of head and continues as a single vitta between antennal tubercles, at which point the vittae diverge shortly; a narrow vitta behind lower lobe of eye, the cheeks, margin of lower lobe of eye and lower margin of front. Pronotum with a broad, white, median vitta enclosing a dark, elongate, rather irregularly diamond-shaped

macula medially, attaining the apex of pronotum but not base; a narrow, white vitta above procoxae. Scutellum entirely white, except for a narrow margin of dark brown. Elytra each having a single broad vitta from base to apex, the lateral margin of which is angularly emarginate at middle. Beneath reddish-brown, rather densely yellowish-white pubescent; the metasternum with a narrow, dark brown vitta laterally; each sternite laterally with a brownish, rather indistinct macula. Legs and antennae dark reddish-brown, thinly gray pubescent. Head above very minutely alutaceous; front alutaceous, with scattered asperities; antennal tubercles well separated basally, at apex obtusely dentate. Pronotum elongate; base feebly wider than apex; apical transverse sulcus wide, rather shallow, basal one deeper, curved medially; sides before basal sulcus tumid; disk finely transversely rugose. Scutellum transverse; sides nearly straight, feebly oblique; apex broadly arcuate. Elytra broad, sides nearly parallel; apex obliquely emarginate, the sutural angle obtusely dentate, the outer angle with a robust tooth; disk coarsely moderately punctate, punctures less fine towards apex. Mesosternal process elevated moderately medially, at apex broadly emarginate. Fifth sternite narrowly, acutely emarginate apically. Profemora and all tibiae serrate ventrally. Antennae with third segment nearly attaining elytral apex (from seventh missing); scape reaching to middle of head, strongly, densely asperate dorsally; third segment over seven times length of scape; fourth longer than fifth, remaining segments gradually shorter; serrate ventrally, asperate dorsally through seventh segment.

Length 16.5–20 mm.; width 3.7–5 mm.

Type in British Museum.

Type locality: "Andaman Islands."

Distribution.—Andaman Islands.

ANDAMAN ISLANDS: ♂; 4♀; no locality data [MRHNB—♂, 3♀; BMNH —♀, paratype].

CYLINDREPOMUS Blanchard

1853. *Cylindrepomus* Blanchard, Voy. Pole. Sud, Zool., IV, p. 268. Thomson, Syst. Ceramb., 1864, p. 386. Pascoe, Trans. Ent. Soc. Lond., (3), III, 1866, p. 259, 318. Lacordaire, Gen. Col., IX, 1872, p. 457. Schwarzer, Senckenbergiana, VIII, 1926, p. 287. Matsushita, Journ. Fac. Agr. Hokkaido, XXXIV, 1933, p. 351. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 532.

1860. *Cylindropomus* Thomson, Class. Ceramb., p. 104.

1925. *Hippardium* Pic, Mél. Exot. Ent., XLIII, p. 21.

Cylindrepomus is distinct from all the other genera (except *Macrocamptus*) in having the metafemora at least attaining apex of abdomen, in its slender body form, and in its slender, pedunculate femora.

Elongate-oblong, slender or very slender, cylindrical. Head with front transverse; eye with lower lobe widest posteriorly, its anterior angle obtuse; antennal tubercles well separated at base, armed at apex. Pronotum elongate (sometimes extremely so) in male, occasionally subquadrate in female; disk transversely rugose, smooth, or sparsely asperate. Scutellum convex. Elytra attenuate posteriorly in male, sometimes nearly parallel-sided in female; disk punctate; apices narrowly rounded and dentate, or acuminate in either sex. Mesosternal process emarginate at apex, sometimes elevated medially; abdomen in male strongly attenuate apically, nearly parallel-sided in female, the fifth sternite as long as or longer than third and fourth together, tapering in male, expanded in female. Legs elongate, slender, the hind ones usually longest; femora slender, strongly pedunculate, especially metafemora, the latter occasionally serrate in male; tibiae slender, metatibiae longest, often serrate in male, as are protibiae occasionally and mesotibiae rarely. Antennae at least twice as long as body in male, somewhat shorter in female, feebly serrate beneath in former sex; third segment ranging from three to ten times the length of scape, usually asperate above at least basally, rest shorter, eleventh slightly longer than tenth.

Genotype: *Cylindrepomus nigrofasciatus* Blanchard, by monotypy.

Key to Species

1. Elytra with a metallic reflex.....2
   Elytra not metallic.....5
2. Elytra without any pubescent markings, uniformly black-blue...*cyaneus*
   Elytra at least with obsolete pubescent markings.....3
3. Elytra with vittae.....4
   Elytra with two transverse gray fasciae.....*atropos*
4. Elytra with a distinct yellowish vitta along side margin on basal half and another near suture.....*malaccensis*
   Elytra with rudimentary obsolete gray vittae.....*mucronatus*
5. Elytra uniformly pubescent, without markings.....6
   Elytra marked with vittae or bands.....8
6. Elytra uniformly gray pubescent.....*grisescens*
   Elytra not gray pubescent.....7
7. Elytra red-brown pubescent.....*javanicus*
   Elytra yellowish tomentose.....*uniformis*
8. Elytra with markings all in form of vittae.....15
   Elytra with at least some transverse markings.....9
9. Elytra each with only two transverse bands, first before middle, second near apical one-third.....*cicindeloides*
   Elytra not maculate as above.....10
10. Elytral markings white.....*albopictus*
    Elytral markings pale gray, reddish, or yellowish.....11

11. Elytra with a transverse (or slightly oblique) black band just behind or at middle....12
    Elytra without a transverse black band....14
12. Elytral median black band prolonged anteriorly at suture....*peregrinus*
    Elytral median black band with sides parallel, not prolonged at suture..13
13. Elytra with first pale fascia at extreme base; pronotum transversely rugose....*nigrofasciatus*
    Elytra with first pale fascia set behind extreme base; pronotum asperate. *laetus*
14. Metatibiae pale, greatly elongate; markings on body above reddish..*comis*
    Metatibiae black except near apex, not greatly elongate; markings yellowish....*astyochus*
15. Elytra each with only a vitta near suture, without other markings....16
    Elytra each with more than one vitta....17
16. Elytral vitta white, close to suture, shortened before and behind, of uniform width throughout....*bilineatus*
    Elytral vitta yellow, attaining suture (common to both), entire, wide at base, attenuate apically....*ledus*
17. Elytra with only two vittae (including those on sides as well)....18
    Elytra with more than two vittae (including lateral ones too, if any)..20
18. Head and pronotum red; lateral discal vitta of elytra broadly interrupted....*sexlineatus*
    Head and pronotum black or dark reddish-brown; elytral discal vittae entire or nearly so....19
19. Antennae with ninth and tenth segments whitish pubescent; elytra with apices bidentate....*albicornis*
    Antennae without white pubesence; elytral apices acuminate or unidentate....*grammicus*
20. Elytra each with three vittae....21
    Elytra each with four vittae (the fourth on sides behind humeri)....22
21. Elytra with two entire discal vittae, joined at apex, and a short one at base between them; elytral apices strongly acuminate....*rubriceps*
    Elytra with one vitta near suture and one along lateral edge, joined at apex, and a short one at base between them; elytral apex truncate, with outer angle produced....*filiformis*
22. Tarsal claws as long as tarsi....*unguiculatus*
    Tarsal claws normal, much shorter than tarsi....23
23. Elytra with median discal vitta short, on basal quarter all vittae narrow, linear....*rubriceps*
    Elytra with median discal vitta entire, the sutural and outer discal vittae broader than others....*aureolineatus*

Cylindrepomus sexlineatus Schultze (Pl. IX, fig. 16.)

1934. *Cylindrepomus sexlineatus* Schultze, Phil. Journ. Sci., LIII, p. 312, pl. 1, fig. 3. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 538, fig. 524.

Sexlineatus can be recognized by the body being entirely red, except for the black elytra and dark antennae; the elytra have the vittae much interrupted.

Female. Elongate-oblong, rather slender, cylindrical; entire body, except the black elytra, bright reddish-brown. Head with front and genae with sparse silky dull golden pubescence. Elytra covered with dark grey or fuscous pubescence, with a fine, broken, linear vitta near suture from base to apical quarter (sometimes absent before middle), a short fine one above declivity on apical third, and a quite small macula just before apex, all markings variable from white to deep fulvous. Body beneath light reddish-brown, covered with short silky golden pubescence. Legs darker reddish-brown, apices of femora, pro- and mesotibiae, and all tarsi (except reddish claws) piceous. Antennae piceous, scape deep reddish-brown.

Head very finely, rather rugosely alutaceous; front not asperate; antennal tubercles robust, prominent, well separated, minutely toothed at apex. Pronotum very slightly longer than wide, sides a little bulbous behind middle, distinctly constricted before base, slightly so near apex, basal transverse sulcus deep, straight, apical one broad, obsolete; disk entirely covered with fine transverse rugosities. Scutellum slightly transverse, apex strongly arcuate or obtusely angulate. Elytra somewhat expanded behind middle, apices separately narrowly rounded, a long robust tooth near suture; disk finely, not densely punctate. Mesosternal process with an elongate elevation on nearly its entire length, apical margin rather strongly emarginate, laterally expanded; fifth sternite nearly as long as second to fourth together, with a fine median longitudinal line, transversely depressed before apex, apex emarginate. Legs rather elongate, hind ones longer. Antennae twice as long as body, finely sparsely serrate on inner side; scape reaching slightly beyond middle of vertex, densely, rather finely asperate; third segment three and one-half times as long as first, finely, sparsely asperate, a little more densely so basally; fourth segment short, fifth and following subequal, eleventh elongate.

Length 14 mm.; width 3–3.2 mm.

Type locality: Mumungau, Lanao prov., Mindanao.

Distribution.—Mindanao, Philippine Islands.

PHILIPPINE ISLANDS: 2♀; Davao, Mindanao; (Baker) [USNM]. NO LOCALITY DATA: ♀ [USNM].

Cylindrepomus cyaneus Pic

1924. *Cylindropomus cyaneus* Pic, Mél. Exot. Ent., LXI, p. 16.
1940. *Cylindrepomus cyaneus* Pic. Breuning, Nov. Ent., suppl. 3, I, p. 535.
1937. *Olenecamptus viridipennis* Pic, L'Echange Rev. Linn., LIII, p. 141.
1940. *Cylindrepomus viridipennis* Pic. Breuning, Nov. Ent., suppl. 3, I, p. 535.

"Narrow, subopaque, black-blue, membrane black, body beneath silvery pubescent. Head elongate, sulcate, densely punctate; thorax narrow and elongate, sinuate, transversely plicate. Elytra slightly broader than thorax, rather short, rather densely punctate. Femora very long. 17 mm. Tonkin. Species very distinct by its bluish coloration." (A translation of the original description.)

Viridipennis Pic, distinguished only by having the elytra greenish instead of blue, is suggested here to be a synonym or a variety of *cyaneus*.

Cylindrepomus atropos new species (Pl. IX, fig. 17.)

While this species appears to be related to *cicindeloides*, it differs in being metallic colored, in lacking the anterior elytral macula, and in having an apical triangular macula.

Female. Elongate-oblong, rather slender, cylindrical; black, shining. Scutellum with an oval, grayish-white macula which covers apex. Elytra with a distinct metallic reflex, mostly reddish or blue, with sparse, fine, short, brownish pubescence, behind middle each with an oblique, grayish-white macula and at apex a small, triangular macula of same color. Beneath black, sterna with thin, grayish-white pubesence, pro- and mesosternal processes and metepisterna densely white pubescent; abdomen with fine, brownish pubescence, the fourth sternite laterally at apex with a narrow, transverse macula of white; fifth sternite at apex laterally, with a small rounded macula of same color. Legs with femora reddish-brown, sparsely covered with very fine, gray pubescence; the tibiae and tarsi dark reddish-brown, clothed with rather long, dark brown pubescence. Antennae piceous, base of third segment more or less reddish-brown, with sparse, fine, grayish pubescence.

Head above minutely, densely punctate; front transverse, minutely alutaceous; eye with lower lobe widened posteriorly, lower margin oblique; antennal tubercles well separated, with a robust, obtuse tooth at apex. Pronotum slightly elongate, base and apex subequal; basal sulcus wide, deep, straight, apical sulcus shallow, very feebly curved; disk entirely transversely rugose. Scutellum transverse; sides very feebly arcuate, apex rounded; medially at apex more or less depressed. Elytra widened behind middle; apices acuminate, at tip with a short, robust tooth; entire surface with well-spaced, moderate-sized punctures. Mesosternal process gradually narrowed to apex, then very slightly widened, apex broadly emarginate. Antennae about one and two-third times body length; scape reaching to beyond middle of head, strongly asperate; third segment four times length of scape, feebly and sparsely asperate; remaining segments subequal, eleventh slightly longer than tenth.

Length 16.7 mm.; width 3.5 mm.

Holotype.—Female; Island of Samar, Philippines; (Baker); [U. S. National Museum].

Cylindrepomus mucronatus Schwarzer

1926. *Cylindrepomus mucronatus* Schwarzer, Senckenbergiana, VIII, p. 290, pl. 5, fig. 6. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 537.

"Upper side blue-black, shining, with rudimentary, extremely fine, gray tomentose vittae; beneath blue-black, with a greenish sheen, very finely, dustily pubescent; episternum and several margins densely gray pubescent; femora on basal two-thirds red-brown, apices of tibiae and the pale tarsi bright pubescent, the rest blackish. Head broad, vertex arched, front with fine median line and with fine, scattered punctures, between the antennal tubercles finely carinate, behind that with a groove, rest of the vertex smooth. Antennae slender, in male twice as long as body, scape short. Pronotum longer than broad, from the side distinctly bent, disk convex, rather strongly transversely rugose, near base and apex constricted. Scutellum rounded. Elytra depressed, nearly parallel, with six longtudinal impressions, basal margin deeply emarginate. Humeri prominent; each apex greatly acuminate, the ends diverging and bristled. Femora at base compressed and bowed, the apical halves thickened, the outer tips distinctly narrowed, otherwise the base as in grammicus, only somewhat less slender. 26–28 mm. Luzon: Immugan. Type in Senckenberg Museum." (Translation of the original description.)

Cylindrepomus malaccensis Breuning

1936. *Cylindrepomus malaccensis* Breuning, Festschr. E. Strand, I, p. 318; Nov. Ent., suppl. 3, I, 1940, p. 534.

"Form extraordinarily elongate, the head widened, antennae very fine, one and one-half times (♀) or two and one-half times (♂) as long as body, third segment in ♀ four times, in ♂ seven times as long as first, twice as long as fourth, scape everywhere granulated, the lower ocular lobe about one-half longer than genae, front broader than high, densely, very finely granulate, antennal tubercles moderately high, vertex very elongate, very finely transversely rugose; pronotum one and one-half times (♀) or twice (♂) as long as broad, very finely transversely rugose. Scutellum broad, triangular. Elytra very long, strongly narrowed and apically pointed, very densely, coarsely punctate, the punctures apically gradually finer. Legs extraordinarily long, front ones in males elongated, the femora clavate, tibiae bowed, the protibiae six times as long as tarsi in ♂, four times in ♀. Black, with blue lustre, finely black tomentose, a narrow vitta on middle of pronotum and middle of scutellum and a similar one on each elytron near suture, green, a short similar band on front half of each elytron near side margin; the underside of femora on front half, the tibiae beyond base, and metatibiae, bright red, as well as the breast and abdomen gray tomentose;

a whitish macula on sides of mesosternum and another each side of hind edge of metasternum. 22–29 mm. Type ♂ from Malacca in British Museum."

Cylindrepomus cicindeloides Schwarzer (Pl. XIV, fig. 16.)

1926. *Cylindrepomus cicindeloides* Schwarzer, Senckenbergiana, VIII, p. 290, pl. 5, fig. 7. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 537.

Distinct from others in this group by having four yellow transverse maculae on elytral disk and the scutellum nearly entirely yellow.

Female. Elongate-oblong, rather slender, cylindrical; black, covered with brownish-black pubescence. Head on occiput and vertex with indistinct, irregular markings of whitish or yellowish pubescence. Pronotum with a short, broad, median vitta basally (not attaining middle) and laterally (above procoxae) a broad vitta which tapers apically, yellowish-white. Scutellum with lateral margins narrowly and apex broadly, yellowish-white pubescent. Elytra each with two lunate, transverse maculae of yellow or yellowish-white, the first at basal third and placed somewhat obliquely, the second at apical third and nearly coalescent with that of the other elytron at suture. Beneath black, covered with fine, yellowish-gray pubescence; mesosternal side-pieces and mesepimera densely yellowish-white maculate; each sternite laterally with a transverse dark brown macula. Femora, pro- and mesotibiae black or piceous, with fine, very sparse, gray pubescence; metatibiae dark reddish-brown, paler on apical quarter and there densely covered with pale pubescence as are the tarsi. Antennae piceous, thinly gray-brown pubescent.

Head above finely, densely punctate; front with sculpturing as in head but with a few fine asperities laterally; antennal tubercles robust, well separated, with a short, obtuse tooth at apex. Pronotum distinctly longer than wide, widest basally; anterior sulcus nearly obsolete, basal sulcus wide, moderately deep; sides just before basal sulcus feebly tumid; disk minutely transversely carinulate. Scutellum transverse; sides straight, feebly oblique, apex arcuate. Elytra feebly narrowed behind basal quarter, distinctly expanded behind middle; apices separately, narrowly rounded, not armed at tip; disk rather shallowly, coarsely punctate, punctures rather indistinct. Mesosternal process not elevated medially, apical margin deeply, angularly incised; fifth sternite slightly longer than third and fourth together, near apex with an arcuate sulcus; apex emarginate. Protibiae and profemora feebly serrate ventrally. Antennae with fifth segment attaining elytral apex (from eighth missing); scape reaching beyond middle of head, feebly asperate; third segment nearly six times length of scape, feebly asperate dorsally, and distinctly serrate ventrally; from fourth gradually shorter.

Length 19 mm.; width 4.3 mm.

Type locality: Mt. Banahao, (Luzon).

Type in Senckenberg Museum.

Distribution.—Philippine Islands.

PHILIPPINE ISLANDS: ♀; Majayjay, Laguna, Luzon, June 6, 1928 (R. C. McGregor) [USNM].

Cylindrepomus peregrinus peregrinus Pascoe (Pl. IX, fig. 9.)

1858. *Cylindrepomus peregrinus* Pascoe, Trans. Ent. Soc. Lond., (2), IV, p. 241; Trans. Ent. Soc. Lond., (3), III, 1866, p. 319. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 540, fig. 531.

By the second band on the elytra being oblique and separated from that at base, this species is at once recognizable.

Male. Elongate-oblong, slender, cylindrical; black-fuscous, with short hoary pubescence. Head at middle of occiput above with a small black macula; front without pubescence except medially above and laterally. Pronotum usually with four transverse, denuded maculae on disk, two apical and two basal, sometimes coalesced. Scutellum densely hoary. Elytra black-fuscous, with dense hoary pubescence arranged in four fasciae: a narrow one just behind base from humerus to humerus, laterally expanded feebly, attaining only basal sixth; second strongly arcuate and oblique, running from before middle at sides of disk to near scutellum, third at apical third, gradually widened to suture, posterior margin straight, or nearly so, rounded anteriorly, denser, and fourth maculiform, occupying apex, widened towards suture and nearly attaining third fascia. Beneath black-fuscous, moderately hoary pubescent, very densely so on mes- and metepisterna, the latter with a small, elongate, denuded macula; metasternum each side with an elongate dark macula; abdomen slightly more densely hoary laterally, sternites 1 and 2 each with a large, irregular, denuded macula. Legs black-fuscous, tibiae near apex and tarsi testaceous, sparsely hoary pubescent. Antennae fuscous, sparsely hoary pubescent.

Head above alutaceous and with well spaced, fine punctures; front transverse, densely punctate, with scattered, fine asperities; eye with lower lobe widened posteriorly, lower margin oblique; antennal tubercles widely separated, with an obtuse tooth at apex. Pronotum elongate, at apex slightly wider than at base; basal and apical transverse sulci broad and deep; disk smooth. Scutellum transverse; sides and apex arcuate. Elytra attenuate apically; apices feebly acuminate, together nearly rounded, the tip at suture prolonged slightly and dentate; entire disk with moderate, well-spaced punctures. Mesosternal process narrowed posteriorly, sides expanded at apex, apical margin broadly emarginate; fifth sternite nearly equal to 2, 3, and 4 together, strongly attenuate apically. Antennae two and one-half times as long as body; scape nearly reaching to pronotal apex, above strongly and densely asperate; third segment four and one-half times as long as first, serrate beneath and asperate above; fourth and fifth shorter, rest gradually

diminishing, except eleventh which is slightly longer than tenth, fourth to seventh serrate beneath.

Female. More robust, less attenuate behind; antennae twice body length, scape only reaching to middle of vertex; fifth sternite not attenuate but of nearly equal width throughout, near apex with a recurved transverse line, which joins the median impressed line.

Length 9.5–16 mm.; width 2–3.2 mm.

Type locality: Borneo and Java.

Distribution.—Java, Sumatra, Nias, and into Borneo, where intermediates between this and *samarensis* occur.

JAVA: ♀; Soekaboemi, August 21, 1924, 2700 feet [ANSP]. ♀; Palabuan; (Fruhstorfer) [CNHM]. ♀; Senggoro, Mts. of Res. Passoeroean, 1899 [A. Koller] [CNHM]. 2♀; Soekaboemi [MRHNB]. NIAS: 2♀; Kalim Bungo [ANSP]. SUMATRA: ♂, ♀; Tandjong Morawa Serdang [RNHL]. ♂; Manna, 1902 [RNHL]. BORNEO: ♂, ♀; Mt. Kina-balu (J. Waterstradt) [ANSP—♂; CNHM—♀]. ♀; Brunei (Waterstradt) [CNHM]. ♂, 3♀; Quop, W. Sarawak; March–April, 1914 (G. E. Bryant) [BMNH]. MALAY STATES: 4♀; Perak [BMNH]. MALAY ARCHIPELAGO: ♀; no locality data [CNHM]. MOLUCCA: 2♀; no locality data [MCZ].

Remarks.—The Nias population has the apical fascia of elytra greatly reduced in size and the lateral macula of the first two abdominal sternites are triangular and much larger.

Cylindrepomus peregrinus samarensis new subspecies (Pl. IX, fig. 10.)

Very similar to the foregoing in all respects except as follows: the maculae on pronotum more distinct; the third elytral fascia more suddenly widened at suture and its posterior margin bi-emarginate (i.e., one emargination on each elytron) and may be coalesced at suture with the apical macula.

Length 12–16 mm.; width 2.3–3 mm.

Holotype.—Male; Samar, Philippine Islands (Baker) [USNM].

Allotype.—Female; topotypic [USNM].

Paratypes.—Philippine Islands; male, female; N. W. Panay. Female; Samar. Male; Cuernos, Mts. Negros. Female; Dapitan, Mindanao. Female; Mt. Banathao. Female; Mt. Makiling, Luzon. Female; Butuan, Mindanao [all collected by Baker and in USNM].

Cylindrepomus nigrofasciatus nigrofasciatus Blanchard (Pl. IX, fig. 8.)

1853. *Cylindrepomus nigrofasciatus* Blanchard. Voy. Pole Sud, Zool. IV, p. 268, pl. 17, fig. 2. White, Cat. Col. Brit. Mus., VIII, 1855, p. 242.

Pascoe, Trans. Ent. Soc. Lond., (3), III, 1866, p. 318. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 541, fig. 533.

This species differs from *peregrinus* by having the two basal bands of each elytron connected as are the two apical.

Male. Elongate-oblong, rather slender, cylindrical; black. Head and pronotum entirely covered with a thin, fine, gray pubescence. Scutellum black pubescent, margin narrowly gray pubescent. Elytra densely ashy-gray tomentose and with black pubescent markings as follows: each elytron with a large, more or less oval macula on basal third, and a smaller one, more or less elongate, on apical quarter, just behind middle a fascia of moderate width; these all conjoin along the lateral margin of the elytra. Beneath black, thinly gray pubescent, mesosternum, mesepisterna, and sides of metasternum densely grayish-white pubescent; abdomen usually with first, second, and third sternites laterally at base with a dark, transverse macula, largest on the first sternite. Legs piceous or dark reddish-brown, bases of femora paler; femora thinly gray or grayish-brown pubescent; tibiae and tarsi dark brown pubescent. Antennae with first, third, and fourth segments medium to dark reddish-brown, remaining segments piceous or black, clothed with very sparse, fine, grayish pubescence.

Head above finely alutaceous; front transverse, surface very minutely granulate; eye with lower lobe slightly widened posteriorly, lower margin feebly oblique; antennal tubercles well separated, at apex with a robust, blunt tooth. Pronotum one-fifth longer than wide, base and apex subequal; basal sulcus deep, narrow, nearly straight, apical sulcus wide, shallow, and curved; disk with surface irregularly transversely rugose. Scutellum transverse; sides and apex arcuate, apex foveate medially. Elytra gradually attenuate; apices acuminate, only very shortly dentate at tip; entire surface with rather large, well-spaced punctures. Mesosternal process not, or only feebly, elevated medially; fifth sternite strongly attenuate apically, apex feebly emarginate. Femora and tibiae not serrate. Procoxae with a feeble, obtuse tubercle posteriorly on inner side. Antennae twice body length; scape about two-thirds length of head, feebly depressed dorsally and coarsely asperate; third segment about four times length of scape, sparsely and feebly serrate, remaining segments gradually shorter, except eleventh, which is about one and one-half times length of tenth.

Female. More robust, elytra widened behind middle; pronotum only very feebly elongate; fifth sternite not strongly attenuate, at apex with a transverse sulcus; antennae about one and two-thirds times body length.

Length 11.3–14.3 mm.; width 2–2.7 mm.

Type locality: Triton Bay, New Guinea.

Distribution.—New Guinea.

DUTCH NEW GUINEA: ♂, 3 ♀; Wasian, Sept., 1938–39 (R. G. Wind) [L. Lacey]. NEW GUINEA: ♂, ♀; no locality data [RNHL]. ♂, ♀; Astrolabe Bay (Rhode) [ANSP—♂, CNHM—♀]. ♂, ♀; Anday [ANSP—♂;

CNHM—♀]. ♀; Njau-Limon, S. of Mt. Bougainville, 300 ft., Feb. 1936 [BMNH]. ♀; Dory [BMNH]. ♂, 2♀; no locality data [BMNH—♂, ♀; MRHNB—♀]. ♂, ♀; Kapaur (Fruhstorfer) [MRHNB]. ♂, ♀; Andai, Aug. 11 (L. M. D'Albertis) [MRHNB—♂; RNHL—♀]. ♂; Hattam [RNHL]. ♀; Fakfak [RNHL]. ♂; Sakroe [RNHL].

Remarks.—Some of the individuals from the same locality have the black basal macula much reduced in size, and to a certain extent the apical one. In a single specimen from Hattam, New Guinea, in the Leiden Museum, there is a connection near the suture between the anterior and posterior marking that gives the insect a resemblance to *comis*.

Cylindrepomus nigrofasciatus fulvithorax Breuning

1940. *Cylindrepomus nigrofasciata* m. *fulvithorax* Breuning, Nov. Ent., suppl. 3, I, p. 541.

This subspecies differs from the nymotype merely in having dull yellowish pubescence on the pronotum instead of the ashy.

AROE: ♂, ♀; no locality data [RNHL].

Cylindrepomus laetus laetus Pascoe (Pl. IX, fig. 11.)

1858. *Cylindrepomus laetus* Pascoe, Trans. Ent. Soc. Lond., (2), IV, p. 241; op. cit., (3), III, 1866, p. 319. Waterhouse, Aid Ident. Ins., II, 1886, pl. 175, fig. 4. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 541, fig. 532.

Laetus and *comis* differ from the other species in this genus by having the disk of the pronotum sparsely, rather feebly asperate.

Female. Elongate-oblong, cylindrical, elytra subconvex; black. Head covered with very thin, fine, grayish-white pubesence. Pronotum with fine, thin, dark brown pubescence, and with a broad median vitta of very thin, grayish-white, a narrower vitta over procoxae and a narrow, transverse fascia at base of denser grayish-white. Scutellum, except for lateral margins, grayish-white pubescent. Elytra thinly, dark brown pubescent, with three transverse fasciae and a macula on each elytron, grayish-white: the first fascia narrow, just behind humerus, connected along suture to second one, which is just before middle and broadest at suture, the third is at apical quarter and somewhat curved and broader medially; the macula is apical, narrow, close to suture (but not common). Beneath black, moderately brownish-gray pubescent, mesosternal side-pieces and sides of metasternum rather narrowly, densely white, the abdomen indistinctly whitish laterally. Legs and antennae black, thinly whitish-gray pubescent.

Head above minutely alutaceous; front feebly, sparsely asperate; antennal tubercles subapproximate basally, with a very obtuse tooth at apex. Pronotum subquadrate; base and apex subequal; apical transverse sulcus shallow

nearly straight, basal one deeper feebly curved medially, disk feebly, sparsely asperate. Scutellum transverse, sides and apex arcuate. Elytra feebly widened medially, thence gradually rounded to apices which are together rounded; entire disk with coarse, deep punctures, those towards apex only very slightly finer. Mesosternal process truncate apically. Fifth sternite medially with a linear elevation from base to apical third, apex angularly emarginate. Metafemora nearly twice as long as mesofemora and feebly asperate on apical third. Antennae about two and one-fourth times as long as body; scape reaching to basal third of head, coarsely, densely asperate; third segment over four times length of scape, fourth slightly shorter than fifth, remaining segments subequal, except eleventh, which is longer than tenth; feebly asperate beneath on third to seventh segment.

Length 11 mm.; width 2.6 mm.

Type locality: Malacca.

Distribution.—Malay Peninsula.

MALAY PENINSULA: ♀; Gunong Takan, near Perak; June 17, 1905, 5300–6000 ft. (H. C. Robinson) [BMNH].

Cylindrepomus laetus shelfordi Aurivillius (Pl. IX, fig. 12.)

1902. *Cylindrepomus comis?* Shelford [non Pascoe], Proc. Zool. Soc. Lond., p. 282, pl. 20, fig. 33.
1911. *Cylindrepomus laetus* var. Gahan, Trans. Ent. Soc. Lond., Bull., p. 79.
1921. *Cylindrepomus laetus* var. *Shelfordi* Aurivillius, Cat. Col., pars 73, p. 213. Breuning, Nov. Ent., suppl. 3, 1, 1940, p. 541.

Very close to the typical form but the color of the pubescent markings is a deep fulvous instead of grayish-white; the scutellum is not margined; the sutural connection between first and second fasciae is much broader, and the third fascia and apical maculae are connected; the lateral white markings beneath of the typical form are yellowish-white and more distinct in this subspecies.

Length 12 mm.; width 2.7 mm.

Type locality: figured without locality.

Distribution.—Borneo.

BORNEO: ♂; Mantang, Sarawak, 3600 ft., June 1900 [BMNH].

Remarks.—Since no male of the nymotypic form was available, the male characteristics are herewith given: antennae more than four times body length; elytra gradually attenuate apically; metatibiae slightly longer than the metafemora; all tibiae finely, densely serrate beneath, the metatibiae more heavily so, and the latter also strongly curved; antennae more strongly, densely asperate; fifth sternite smooth, apex subtruncate.

Cylindrepomus astyochus new species (Pl. IX, fig. 14.)

While very closely related to *laetus,* this species is more elongate, the pronotum is not asperate, and the elytral bands are all connected at suture.

Male. Elongate-oblong, slender, cylindrical; black, densely covered with ochraceous tomentum, with fuscous pubescence as follows: head fuscous along occiput. Pronotum with a broad, short, arcuate vitta each side of disk, not attaining base or apex. Elytra largely fuscous laterally and with a short vitta along suture before middle, leaving an irregular zigzag vitta from behind humerus to apex, prolonged laterally just before middle and again behind middle, on apical third broader and straight, and with a V-shaped basal macula, ochraceous. Metathorax laterally with an elongate-oblong macula and sternites 1 and 2 with a triangular macula each side, fuscous. Legs and antennae fuscous, not pubescent; femora at base and tibiae reddish-brown, tarsi pale.

Head on vertex with a few fine punctures near upper lobe of eye; front not asperate; eye with lower margin oblique, strongly arcuate anteriorly; antennal tubercles robust, prominent, not contiguous, minutely toothed at apex. Pronotum about one-fourth longer than wide, sides tumid behind middle, otherwise nearly parallel; with a distinct, broad, transverse sulcus at base, the apical one obsolete; disk not rugose. Scutellum transverse, sides slightly widened posteriorly, apex strongly rounded. Elytra broadly constricted at middle; apices rather strongly acuminate, feebly divergent; disk near base with a few very fine punctures. Mesosternal process moderately broad, sides tapering posteriorly, angularly expanded at apex, apical margin subtruncate; fifth sternite longer than third and fourth together, apex broadly rounded, without sculpturing. Legs long, slender, hind ones longest; procoxae tumid posteriorly, unarmed; protibiae densely serrate on inner margin; protarsi feebly expanded. Antennae more than twice length of body, fourth segment nearly attaining elytral apex, asperate above and serrate beneath on all segments; scape reaching slightly beyond middle of vertex; third segment four times as long as first, rest shorter, subequal, eleventh arcuate, longer than tenth.

Length 15 mm.; width 3 mm.

Holotype.—Male; Palawan, Phil. Is. (Platen) [Academy of Natural Sciences of Philadelphia, type no. 8248].

Cylindrepomus comis Pascoe (Pl. IX, fig. 13.)

1858. *Cylindrepomus comis* Pascoe, Trans. Ent. Soc. Lond., (2), IV, p. 241, pl. 25, fig. 7; loc. cit., (3), III, 1866, p. 320. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 542, fig. 535.

The bright reddish-ochraceous pubescence of the elytra, with the four black maculae, distinguishes this species from any other of this genus.

Male. Elongate-oblong, slender, cylindrical, elytra subconvex; black or piceous, reddish-ochraceous pubescent. Head with front, sides, and a small, triangular macula at base of occiput, black. Pronotum with a wide, black vitta laterally. Each elytron laterally with four black maculae (all connected at lateral edge of elytra), one basally, transverse, second on basal third, rounded, third on basal two-thirds, more or less triangular, largest, fourth at apex, somewhat oval. Beneath black or piceous, thinly, finely gray-pubescent, laterally densely gray-pubescent, tinged with reddish-ochraceous. Legs piceous, apical half of tibiae and tarsi much paler, thinly dark brown pubescent. Antennae piceous or dark reddish brown, nearly glabrous.

Head above minutely alutaceous; front alutaceous, sparsely and feebly asperate; eyes with lower lobe feebly transverse; antennal tubercles subapproximate basally, at apex armed with a subobtuse tooth. Pronotum slightly elongate, base and apex subequal; apical sulcus nearly straight, basal one curved medially; disk sparsely but regularly asperate. Scutellum transverse, sides and apex arcuate. Elytra with sides gradually attenuate, apices squarely truncate, outer angle not dentate; disk densely, very coarsely punctate, punctures but little finer apically. Mesosternal process subtruncate at apex. Fifth sternite subtruncate apically. Legs with metafemora and tibiae greatly elongate, the tibiae curved and serrate ventrally. Antennae about two and one-half times body length; scape reaching to basal third of head, strongly, densely asperate dorsally; third segment over three times as long as scape; fourth slightly longer than fifth; remaining segments shorter, except eleventh which is longer than tenth; third and fourth segments feebly asperate above, third through ninth feebly serrate ventrally.

Length 8.2 mm.; width 2.2 mm.

Type locality: Borneo.

Distribution.—Borneo.

Borneo: ♂; Sarawak, 1910 (J. E. A. Lewis) [BMNH].

Cylindrepomus albopictus Breuning

1938. *Cylindrepomus albopictus* Breuning, Nov. Ent., VIII, p. 42, fig. 22; loc. cit., suppl. 3, I, 1940, p. 542, fig. 534.

"Near *nigrofasciatus* Blanch., but: Elytra punctate more finely, pointed at tip.

"Black with blackish-brown pubescence; pronotum and beneath covered with a clear gray pubescence, denser and more or less white on front, scutellum, and sides of mesosternum; three black spots on occiput; on each side of pronotal disk, two black spots, placed one after the other, sometimes connected into two longitudinal bands. On each elytron a white transverse basal band, extending behind humeral callus, a quadrangular discal premedian spot, joined along suture with basal band, a transverse postmedian band, very enlarged toward suture, and an elongate spot, covering the apical

part and united along suture with preceding. A large, elongate, blackish-brown spot on sides of metasternum. Legs and antennae covered with very fine gray pubescence; protibiae and mesotibiae reddish-brown; tarsi yellow.

"Length 12–13 mm.; width 2½ mm.

"Type: ♂ from Java: Mont Smeron, in collection Le Moult." (A translation of the original description.)

Cylindrepomus ledus new species (Pl. IX, fig. 7.)

Although close to *C. grammicus,* this is at once distinct in having only one vitta on the elytra and in lacking all vittae behind the eyes.

Male. Elongate-oblong, slender, subcylindrical; black or piceous. Head with sides and margins of front thinly whitish pubescent; vertex with fine, sparse, dark brown pubescence. Pronotum densely yellow pubescent. Scutellum entirely yellow pubescent (slightly paler than pronotum). Elytra with thin, fine, dark brown pubescence and with a common sutural vitta which is widest basally, becoming attenuate apically, of dense, yellow tomentum. Beneath reddish-brown, thinly grayish pubescent, towards sides of meso- and metasterna more densely white pubescent, metasternum with a large, brown, triangular macula at middle; sternites laterally each with an irregular, whitish macula. Legs dark reddish-brown; femora on basal half paler; clothed with thin, dark brown pubescence; tarsal segments, including claw, on inner half dark brown pubescent, on outer gray pubescent. Antennae piceous or dark reddish-brown, slightly paler towards apex.

Head above alutaceous; eye with lower lobe strongly widened posteriorly; antennal tubercles prominent, well-separated. Pronotum elongate, apex feebly narrower than base; apical and basal sulci wide and moderately deep; discal sculpture concealed by dense tomentum. Scutellum transverse, sides and apex rounded. Elytra attenuate apically, apices separately, narrowly rounded; entire surface with well-spaced, coarse, deep punctures. Mesosternal process gradually narrowed apically, shortly and suddenly expanded there, apical margin broadly emarginate; fifth sternite very elongate, attenuate apically, apical margin rounded. Metacoxae swollen. Antennae about two and one-half times body length; scape nearly two-thirds length of head, robust, strongly asperate dorsally; third segment about four and one-half times length of scape, feebly serrate; fourth segment slightly shorter than fifth, remaining segments subequal, except eleventh which is distinctly longer than tenth; segments 4, 5 and 6, very feebly serrate beneath.

Length 13.5 mm.; width 2.5 mm.

Holotype.—Male; Ilat, E. coast, Boeroe (Doherty) [ANSP no. 8249].

Cylindrepomus bilineatus Schwarzer

1926. *Cylindrepomus bilineatus* Schwarzer, Senckenbergiana, VIII, p. 289, pl. 5, fig. 5.

"Black with white lines, each side of the pronotum a very low set one and on each elytron a line near the suture, shortened before and behind. Body more robust, more cylindrical. Front and vertex with a fine median line, former very finely granulate. Antennae in male two and one-half times as long as body, moderately robust, first segment short, clavate, relatively not so thick as in *grammicus,* otherwise similar. Head only slightly broader than pronotum, this somewhat longer than broad, near the base strongly, apically not distinctly incised; disk to apex finely transversely rugose. Elytra equilaterally, separately, acuminately angulate, the tip pointing directly posteriorly, on base more strongly, posteriorly more weakly punctate, near apex punctures obsolete. Beneath thinly gray pubescent, the metepisterna and several margins densely pubescent. Legs less slender than in *grammicus.* Profemora on basal third bowed and edged, somewhat compressed, the rest gradually clavate. Protibiae arcuate near apex, not serrate. 28–29 mm. North Celebes (Magondouw). Type in Senckenberg Mus.

"Somewhat like an *Olenecamptus* in appearance but because of the acuminate elytral apices and the unserrate protibiae, I have placed it in *Cylindrepomus.*". (Translation of the original description.)

Cylindrepomus albicornis Nonfried

1894. *Cylindrepomus albicornis* Nonfried, Deutsche Ent. Zeit., XXI, p. 212.

"Shining black-brown. Head short, broad, rugosely-punctate, very thickly covered with light ochre-yellow, in among which are single longer upright hairs; front rougher brown pubescent, medially yellow vittate. Antennae brown, finely punctate; first segment long, pear-shaped, second very short, rest longer than first, ninth and tenth whitish pubescent, rarely shining, eleventh brown. Thorax cylindrical, distinctly broader than head, less rugosely punctate, very densely whitish pubescent, opaque, with four brown broad vittae, two on the edge, the other two at middle, all not far from one another. Scutellum small, rounded, densely pubescent. Elytra long, gradually widened, thence narrower posteriorly, apices each acutely bidentate, shining red-brown, seriately punctate, punctures fine, deep; extremely finely pubescent, with two whitish stripes, one densely pubescent, narrow, near suture, second broad posteriorly becoming sparsely pubescent, hence indistinct, in middle of disk. Beneath dark brown, densely punctate, gray pubescent, edges of sterna whitish, but more light yellow. Legs slender, elongate, gray pubescent, dark brown, shining. 13 mm. Tebing-Tínggi (South Sumatra)."

The above is a translation of the original description.

Cylindrepomus grammicus grammicus Pascoe (Pl. IX, fig. 1.)

1860. *Cylindrepomus grammicus* Pascoe, Ann. Mag. Nat. Hist., (3), v, p. 121; Trans. Ent. Soc. Lond., (3), III, 1866, p. 319, pl. 14, fig. 5. Waterhouse, Aid Ident. Ins., II, 1886, pl. 175, fig. 2. Schwarzer, Sencken-

bergiana, VIII, 1926, p. 288. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 535, fig. 522.

1926. *Cylindrepomus grammicus* race *acuminatus* Schwarzer, Senckenbergiana, VIII, p. 288, pl. 5, fig. 3.

1940. *Cylindrepomus grammicus* m. *latefasciata* Breuning, Nov. Ent., suppl. 3, I, p. 535.

This is undoubtedly the most difficult and most unsatisfactory species of the group from the standpoint of variation and subspeciation. In many cases there is far greater difference between representatives from any one locality than between individuals from even widely separated places! Moreover, Pascoe was unfortunate in having had to describe the species originally on examples from an area in which intermediates between two races occur. Consequently, his name could be applied to either form with equal propriety. The authors chose to apply it to that subspecies which agreed most closely with his original notes. The species as a whole may be recognized by the elytra each possessing two entire, discal, whitish vittae; the pronotum with a pale vitta each side of disk, or entirely white or yellow pubescent; body beneath largely pubescent; and elytral apices acuminate to a greater or lesser degree.

Male. Elongate-oblong, rather slender, cylindrical; black, elytra often dark reddish-brown, with dull yellowish-white vittae as follows: a distinct one each side of head, continued along eye and connecting on vertex, and a broad one behind eye. Pronotum with a rather fine one each side of disk, connecting along basal and apical margins with a slightly narrower vitta above the coxa. Scutellum sometimes spotted. Elytra each with two more or less parallel vittae, one approaching suture, often widened anteriorly, and one near side of disk, somewhat sinuate and swollen at middle, joined before apex and thence extended to the tip. Body beneath black, sparsely white pubescent, irregularly maculate, especially laterally, with black. Legs and antennae blackish, femora and scape dark reddish-brown.

Head finely, densely alutaceous; antennal tubercles robust, prominent, briefly armed at apex. Pronotum elongate, one-fourth longer than wide; both sulci rather shallow; disk transversely rugose medially. Scutellum broadly rounded. Elytra narrowed gradually from base; apices separately acuminate, the acumination variable in its extent, sometimes greatly prolonged, sometimes weakly so, at extreme tip a fine, acute tooth; rather finely, densely punctate, more finely so on apical third. Mesosternal process rather narrow, tapering posteriorly, apex emarginate; fifth sternite about as long as third and fourth together, apex nearly entire. Metatibiae unarmed. Antennae more than twice length of body; scape reaching beyond middle of

vertex; third segment more than four times as long as first, fourth much shorter, rest gradually diminishing; asperate above and serrate beneath nearly from scape to extreme tip.

Female. Differs in having pronotum less elongate; elytra slightly widened behind middle; fifth sternite broad, apex deeply emarginate; antennae shorter, not serrate beyond fifth segment.

Length 12–15 mm.; width 2–3 mm.

Type locality: Batjan (*grammicus*); Magonouw, N. Celebes (*acuminatus*); Batjan (*latefasciata*).

Distribution.—Celebes and throughout the Moluccas.

CELEBES: 3♂, ♀; no locality data [BMNH; MCZ]. 5♂, 5♀; Toli-Toli [ANSP; USNM; CNHM; RMNHS]. ♀; Latimodiong Mts., June 23, 1930 (G. Heinrich) [BMNH]. MOLUCCAS: ♀; no locality data [MCZ]. 4♂, 2♀; Batjan [ANSP; RMNHS; MCZ]. ♀; Ceram [BMNH]. ♂, ♀; Wahaai, Ceram [MCZ]. ♀; Honitetu, W. Ceram, Mar. 1892 (Martin) [USNM]. ♀; Ilat, E. coast, Boeroe [USNM]. 2♂; Halmahera [CNHM]. ♂; Dodinga, Halmahera [CNHM]. ♀; Halmahera [RNHL]. ♂; Forsten [RNHL]. WAIGEO: ♂; no locality data [BMNH].

Cylindrepomus grammicus oxypterus Fairmaire (Pl. IX, fig. 2.)

1879. *Cylindrepomus oxypterus* Fairmaire, Naturaliste, p. 75; Pet. Nouv. Ent., 1879, no. 75; An. Soc. Ent. Belg., XXVII, 1883, p. 52. Waterhouse, Aid Ident. Ins., II, 1886, pl. 175, fig. 1.

1926. *Cylindrepomus grammicus* race *citrinicollis* Schwarzer, Senckenbergiana, VIII, p. 289, pl. 5, fig. 4.

Differs from the nymotype only as follows: the pale vittae of the body above wider, especially those of pronotal disk, each of which is distinctly broader than the space between them, frequently coalescent and covering entire disk, when they are often yellow; elytra often with the subsutural vitta quite widened, especially towards base; and body beneath more extensively white pubescent, notably on abdomen. Length 8–17 mm.; width 1.8–3.5 mm.

Type locality: Duke of York Island (*oxypterus*); patria unknown (*citrinicollis*).

Distribution.—New Guinea, New Britain, and Waigeo.

NEW GUINEA: ♂; Sattelberg, Dutch N. G. [RMNHS]. ♀; Baings Mts. [RMNHS]. 2♂; JOBIE ISL.: Geelwink Bay [USNM; ANSP]. WAIGEO: 3♂; no locality [BMNH; RMNHS; RNHL]. NEW BRITAIN: 2♀; no locality [BMNH; RNHL].

Cylindrepomus grammicus marshalli new subspecies (Pl. IX, fig. 4.)

Closely related to *g. oxypterus* but distinct in having all pubescent markings, above and below, white, with the exception of those on the elytra, which are dull yellowish, except at extreme base and apex; the pronotal vittae are distinctly broader than those of head, rather wider basally, where they continue along basal margin (except for a narrow interruption at middle); the elytral vittae are strongly expanded, especially on basal half, where they occupy almost the entire surface, the lateral discal one is narrowly interrupted at middle.

Length 14 mm.; width 2.8 mm.

Holotype.—Male; Admiralty Isl., Nov. 16, 1944; (P. T. Riherd) [USNM].

Cylindrepomus grammicus hecate new subspecies (Pl. IX, fig. 3.)

Resembles *g. oxypterus* in having wide, yellow vittae (rarely coalescent medially) but differs in lacking the vittae on the head above (very rarely present); the elytral vittae are, as a whole, more as in the nymotype, being narrow, not much expanded basally.

Length 12–17 mm.; width 2.5–3.5 mm.

Holotype.—Male; Guadalcanal, Solomon Isl. (L. N. Jarcho) [MCZ].

Allotype.—Female; same data as holotype [MCZ].

Paratypes.—Solomon Islands: 2 males; topotypic [MCZ; USNM]. 3 males, female; Fulakora [MCZ]. Male; Tulagi, Florida Isl. [MCZ]. Male, female; Munda, N. Georgia [USNM]. Female; Auki, Malaita Isl. [MCZ]. Male; Solomon Isl. [BMNH]. 7 males, 4 females; Bougainville [RMNHS; MRHNB]. Australia: female; no locality [RMNHS]. Fiji Islands: female; Labeti (W. M. Mann) [MCZ].

Cylindrepomus rubriceps Aurivillius (Pl. IX, fig. 5.)

1907. *Olenecamptus rubriceps* Aurivillius, Ark. Zool., III, (18), p. 31.
1925. *Hippardium vittatum* Pic, Mél. Exot. Ent., XLIII, p. 22.
1926. *Cylindrepomus rubriceps* Aurivillius. Schwarzer, Ent. Mitt., XV, p. 17. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 534.
1940. *Cylindrepomus vittatus* Pic. Breuning, Nov. Ent., suppl. 3, I, fig. 533.

Vittatus according to Breuning has the head black, but Pic in his original description states that it and the scape are, in part, red. Thus it is a synonym of the present species.

Male. Elongate-oblong, very slender, cylindrical; head reddish-brown, pronotum and elytra dark reddish-brown or piceous. Head above and on

front with very thin, fine, pale fulvous pubescence, sides and narrow margin around eye thinly white pubescent. Pronotum with five, narrow, white vittae, one at middle (widest and thinly pubescent, with a narrow glabrous line medially), two either side of middle one, the first somewhat lateral, second just above the procoxae. Scutellum very thinly, pale fulvous pubescent. Elytra each with three, narrow, white or yellowish-white discal vittae, the first near suture from base to apex, the second from middle of base, much narrower and less densely pubescent, only attaining basal quarter, the third from humerus to apex, joining the first there, along lateral margin a narrower one, sometimes absent wholly or in part. Beneath piceous or dark reddish-brown, rather thinly clothed with white pubescence; the mesosternal side-pieces, metepisterna, a narrow lateral vitta on metasternum, a macula on procoxae laterally, metacoxae and two vittae each side of abdomen, all densely white pubescent (sometimes yellowish-white). Legs dark reddish-brown or piceous, very thinly clothed with white or pale gray pubescence. Antennae with scape reddish-brown, remaining segments dark reddish-brown or piceous; scape and basal quarter of third segment with very sparse, white pubescence.

Head above and front minutely, densely granulate; front transverse; eye with lower lobe scarcely widened posteriorly, lower margin nearly straight; antennal tubercles prominent, well-separated, with an obtuse projection at apex. Pronotum three and one-half times as long as wide, base and apex subequal, narrowest at apical third; basal sulcus deep, narrow, apical sulcus feeble and recurved; entire disk rather regularly, transversely rugose. Scutellum transverse, sides and apex arcuate. Elytra feebly widened behind middle, apices acuminate, with a short subacute tooth at tip; disk seriately punctate, with seven or eight rows of coarse, deep punctures. Prosternum not arched between procoxae, mesosternal process gradually narrowed to apex, then suddenly, shortly expanded each side, apex broadly emarginate. Forelegs slightly longer than hind ones. Metacoxae not enlarged. Fifth sternite elongate, narrow, not impressed. Antennae nearly three and one-half times body length; scape nearly two-thirds the length of head, robust, densely asperate; third segment slightly more than ten times length of scape (nearly attaining elytral apex), straight, feebly and sparsely asperate; fourth segment and remaining segments gradually shorter. Eleventh feebly longer than tenth.

Female. As male but a little more robust; pronotum two and one-half times as long as wide; antennae about two and one-half times length of body, third segment six times as long as scape; and fifth sternite not elongate, with a median compressed line.

Length 12–13 mm.; width 1.7–2 mm.

Type locality: Java (*rubriceps* and *vittatus*).

Distribution.—Java.

JAVA: ♀; Tiji Solak, Wijnkoopsbaai (Grelak) [USNM]. ♂, ♀; Tengger Mts., East Java (H. Fruhstorfer) [USNM—♀; ANSP—♂]. ♂, ♀; Pala-

buan (H. Fruhstorfer) [ANSP]. ♂; no locality data [MRHNB]. ♀; Malang [RNHL].

Cylindrepomus filiformis Breuning

1937. *Cylindrepomus filiformis* Breuning, Festschr. E. Strand, IV, p. 225.

"Close to *vittatus* Pic (described as *Hippardium vittatum* Pic, but shows no sharply defined differences from *Cylindrepomus*) but: Elytra apically sharply truncate, with pointed side angle. Red brown, everywhere bright brown tomentose; each side of vertex a narrow ochre-yellow vitta; on pronotum five such bands; on each elytron two such bands (one near suture, one on lateral edge), joined towards apex, and one narrower one between them on basal fourth. Length 12½ mm.; width 2 mm. Type from Andamans in Brit. Mus." (A translation of the original description.)

Cylindrepomus aureolineatus new species (Pl. IX, fig. 6.)

1940. *Cylindrepomus albicornis* Breuning [non Nonfried], Nov. Ent., suppl. 3, I, p. 536, fig. 523.

Somewhat related to *C. albicornis* in having the antennae densely white pubescent near tip; in the present instance, however, the antennae are white from the ninth segment to extreme tip of eleventh. On the other hand, in *albicornis* only the ninth and tenth segments are white. In addition, in the present form the elytra are trivittate and end in an extremely long acumination, and the scutellum is entirely black.

Female. Elongate, very slender, black, very finely, sparsely, fuscous pubescent and with golden-yellow vittae as follows: head with three vittae, one medially and one behind each eye; front margined each side and each side of middle maculate with golden yellow. Pronotum with three vittae, continuing those of head, the median one narrower than the others and subdivided by a fine, glabrous, longitudinal line. Elytra each with three discal vittae, the first near suture, rather broad, second very fine, close to first, third slightly broader than first, near edge of disk, all three conjoined at base, the first and third connected at apex and prolonged onto the acumination; below humerus (and sometimes along sides close to apex) a short, not very distinct vitta. Body beneath blackish, sparsely white or yellowish-white pubescent; laterally with pubescence condensed to form a vitta from below eye reaching to tip of metasternal side-pieces, anteriorly often more distinctly yellow. Antennae black, the last three or four segments entirely silky-white pubescent. Legs piceous; femora paler at base.

Head with front finely asperate; antennal tubercles robust, armed with a short tooth at apex. Pronotum twice as long as wide, narrower anteriorly; transverse sulci broad, the posterior one more distinct; disk finely, not distinctly, transversely rugose. Scutellum small. Elytra gradually narrowed

apically, apices greatly prolonged and acuminate; disk coarsely, seriately punctate between vittae, finely, irregularly so on the vittae. Mesosternal process emarginate at apex; fifth sternite as long as third and fourth together, impressed before apex, apical margin emarginate. Hind femora gradually longer than others. Antennae about twice length of body.

Length 10–19 mm.; width 1.8–3 mm.

Holotype.—Female; Mt. Marinjak, Sarawak, May 23, 1914 (G. E. Bryant) [BMNH].

Paratypes.—2 females; Sarawak. 2 females; Quop, W. Sarawak [all BMNH]. Female; Balikpapa, Borneo, July 8, 1912 [RNHL].

Cylindrepomus unguiculatus Nonfried

1894. *Cylindrepomus unguiculatus* Nonfried, Deutsche Ent. Zeitschr., XXI, p. 212.

"Shining dark-brown, densely punctate. Head rugosely punctate, sparsely yellow pubescent; front medially bicarinate, densely granulate, brown, median sulcus yellow pubescent. Antennae long, shining dark brown, densely punctate, with long hairs. Thorax cylindrical, weakly transverse, rugose, densely whitish pubescent, sparsely coarsely punctate, opaque, with four broad brown stripes, which leave only narrow white spaces between, the middle white stripe is about twice as broad as the side ones. Scutellum rounded, with long whitish pubescence. Elytra as in *albicornis,* everywhere densely punctate, shining brown, not pubescent, each with four whitish-pubescent vittae, as follows: first densely pubescent, near suture, second barely visible, near middle, third at middle, very densely pubescent, fourth short, near side margins, all are very narrow, linear. Beneath dark fuscous, shining, densely punctate, sparsely yellowish pubescent. Legs densely punctate, gray pubescent, tarsi equally long, claws very long, longer than the tarsi, shining black-brown. 16 mm. Tebing-Tinggi (South Sumatra)." (Translation of the original description.)

Cylindrepomus uniformis Breuning

1937. *Cylindrepomus uniformis* Breuning, Festschr. E. Strand, IV, p. 225.

"Near to *javanicus,* but: Form broader, pronotum somewhat broader than long, apical spine of elytra shorter. Red, everywhere finely yellowish tomentose; antennae yellowish, from fourth apically darkened. Length 10–11 mm.; width 2¼–2½ mm. Type 1 ♀, from British India: Bilaspur, Ama-Nala, in British Museum." (Translation of original description.)

Cylindrepomus javanicus Breuning

1936. *Cylindrepomus javanicus* Breuning, Festschr. E. Strand, I, p. 317.

"Close to *rubriceps* Auriv., which species is erroneously placed under *Olenecamptus* in Schenkling's catalog; however, the pronotum at middle

more bowed in; the elytra more finely punctate, apices more obliquely truncate, the marginal angle produced into a short, broad spine. Red, throughout uniformly red-brown tomentose. 11 mm. Type from Java in the British Museum." (Translation of original description.)

Cylindrepomus grisecens Pic

1939. *Cylindrepomus grisecens* Pic, Rev. Française d'Ent., VI, p. 183.

"Oblong, slightly shining, black, uniformly gray pubescent, head rather short; behind eyes and at middle posteriorly with a black glabrous spot; antennae very long, scape broad; thorax slightly short, sides sinuate, minutely sculptured. Elytra short, posteriorly attenuate, rather strongly punctate, in part punctures minute, in part irregular; legs rather elongate; femora not thickened, protibiae sinuate, tarsi with long pile; hind femora beneath arcuately sinuate. 12 mm.

"Tonkin; sept-monts du Haut Song Chi. Type in Museum de Paris."

The above is a translation of the original description.

Cylindrepomus biconjunctus Breuning (Pl. IX, fig. 15.)

1940. *Cylindrepomus biconjunctus* Breuning, Nov. Ent., suppl. 3, I, p. 537. Breuning and de Jong, Zool. Meded., XXIII, 1941, p. 67, fig. 9.

"Approaches *grammicus* but the lower lobes of eyes three times as long as genae; disk of pronotum slightly, transversely rugose; elytra terminating in a long, very slender spine; femora very slender, a little pedunculate.

"Brown; base of femora reddish; covered with brown pubescence, head yellow pubescent, except a small elongate spot at middle of hind margin of vertex, but this pubescence is fine on front and genae. Five yellowish rather broad vittae on pronotum (only the median one straight): two on lateral parts, the three discal ones united at base by transverse band. On each elytra two yellow straight vittae, a little curved (one almost to the suture, the other at middle of disk), united a little before middle, and two others, which begin a little after, but unite almost to the suture by a straight longitudinal band with the premedian sutural, then the sutural continues almost to tip of apical spine; the discal is straighter and curves (at its union with the sutural) towards the suture at its anterior border and at the base of the apical spine. Beneath except epipleura [!] of metathorax, a straight band on extreme lateral margin of abdomen, a transverse spot on each side of first and second sternites and several longitudinal lines on sterna, is covered with whitish yellow pubescence; femora and scape with fine gray pubescence; tibiae yellowish pubescent, dense at apical quarter, the same as the tarsi; antennae (except scape) without pubescence.

"Length 17–19 mm.; width 3¼–3½ mm.

"Described by me on individuals of northeast Sumatra: Serdang, Tandjong-Morawa, in the Museum of Leyden." (A translation of the original description.)

MICROLENECAMPTUS Pic

1925. *Cylindropomus* (*Microlenecamptus*) Pic, Mél. Exot. Ent., XLIII, p. 22.

1940. *Microlenecamptus* Pic. Breuning, Nov. Ent., suppl. 3, I, p. 559.

This genus is closest to *Cylindrecamptus* in the form of its eye and pronotum but is distinct in having the third antennal segment much longer than fourth. From *Olenecamptus* it is distinct in having the hind legs longer than the others; from *Cylindrepomus* it is distinguished in having the femora robust, the metafemora not attaining the tip of abdomen. From all the other genera it differs in the shape of the femora, of the eyes, and of the front.

Elongate-ovate, rather robust, cylindrical. Head with front slightly transverse; eye with lower lobe subquadrate (slightly transverse in female), anterior margin broadly rounded, not at all angulate beneath; antennal tubercles well separated at base. Pronotum subquadrate. Elytra parallel-sided in male, slightly widened behind middle in female; apices broadly subtruncate, or acute (*albonotatus*), unarmed. Mesosternal process angularly emarginate at apex, not elevated medially; fifth sternite tapering, shorter than third and fourth together in male, broad and longer than third and fourth together in female. Legs rather short, hind ones longest; femora robust, gradually clavate or strongly clavate, metafemora not attaining tip of abdomen; protibiae unarmed in male, sparsely fringed (heavily so in *signatus*). Antennae about two and one-half or three times as long as body in male, nearly twice as long in female, rather densely, but very finely fringed beneath with extremely short hairs in both sexes (fringe long in *signatus*); scape comparatively long, reaching close to apex of pronotum; third segment not more than two and one-half times as long as first (♂), or twice as long in female, not asperate in either sex; fourth distinctly shorter than fifth; eleventh very elongate in male.

Genotype: *Cylindropomus albonotatus* Pic, by original designation.

The type of the genus, unfortunately unseen during the course of this study, is atypical in the form of the elytral apices. There may be other structural differences as well, which would therefore warrant the erection of a new genus for the other species here included.

Key to Species

1. Elytra acutely pointed at apex.....*albonotatus*
   Elytra subtruncate at apex.....2

2. Elytra with white pubescent markings.....*signatus*
   Elytra with glabrous markings.....3
3. Elytra gray pubescent, median macula of disk large, ocellated..*biocellatus*
   Elytra white pubescent, median macula of disk very small, not ocellated. *obsoletus*

Microlenecamptus obsoletus albatus (Matsushita) (Pl. XIV, fig. 5.)

1933. *Dorcaschema albatum* Matsushita, Journ. Fac. Ag. Hokkaido Imp. U., XXXIV, p. 353.
1940. *Olenecamptus obsoletus* Fairmaire. Breuning, Nov. Ent., suppl. 3, I, p. 559 [ex parte].

Resembles *O. clarus* but differs in having only a single glabrous macula on disk of each elytron and the elytral apices are rounded.

Male. Elongate-oblong, slightly robust, cylindrical; black, uniformly covered with a grayish-white pubescence, that of head whiter, and with denuded black spots as follows: head with three small maculae along base, one medially and one each side; front in part denuded. Pronotum with five maculae, an oblong one at middle, an irregular one each side of disk near middle, and a small, rounded one on extreme side before middle. Elytra each with an irregular macula on humeri, a rounded one at middle, and a small, rounded one on sides well behind humeri. Body beneath black, grayish-white pubescent, pubescence medially on sterna tinged with brownish. Legs piceous, grayish-white pubescent. Antennae black, fourth to sixth segments piceous or dark reddish-brown, remaining segments somewhat paler.

Head minutely alutaceous; front minutely alutaceous and finely punctate, not asperate; eye with lower lobes feebly oblique, widened posteriorly, upper margin strongly oblique; antennal tubercles robust, slightly prominent, at apex with a distinct tooth. Pronotum as long as wide, sides constricted behind middle; basal sulcus broad, shallow, apical one nearly wanting; disk with a few, low, transverse rugosities before middle, posteriorly punctate. Scutellum strongly transverse, apex arcuate. Elytra with sides gradually arcuately narrowing to apices, which are separately, broadly rounded; entire surface with fine punctures showing through pubescence, those on anterior half coarser. Mesosternal process slightly impressed, apex deeply triangularly notched; fifth sternite broadly truncate at apex. Mesotibiae without trace of an internal process at apex. Antennae about two and one-half times as long as body, fifth segment nearly attaining elytral apex; scape reaching beyond middle of vertex, densely coarsely asperate above; third segment nearly four times as long as first, not asperate above, fourth much shorter, fifth and following subequal, eleventh strongly elongate.

Length 10 mm.; width 2.8 mm.

Type locality: Taihorin, Formosa.

Distribution.—Formosa.

FORMOSA: ♂; Kuraru (L. Gressitt) [CAS].

Microlenecamptus obsoletus obsoletus Fairmaire (Pl. XIV, fig. 6.)

1888. *Olenecamptus obsoletus* Fairmaire, Rev. d'Ent., VII, p. 145. Savio, Not. Ent. Chin., II, 1929, p. 6, fig. 4. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 559, fig. 579.

Male. Differs from the foregoing as follows: head with median black macula reduced in size. Pronotum with median macula more elongate, subvittiform, those of sides of disk wanting, and that on each extreme side elongate, vittiform, reaching from near base to near apex. Elytra with lateral macula entirely absent; disk with punctures showing through pubescence only anteriorly and then very feebly so. Legs piceous or black. Antennae with third segment at most only three times length of scape.

Length 7 mm.; width 2 mm.

Type locality: Peking.

Distribution.—Eastern China.

CHINA: 6♂, 5♀; Shanghai, July [CAS—♂; CNHM—4♂, 4♀; L. Lacey —♂, ♀].

Microlenecamptus biocellatus Schwarzer (Pl. XIV, fig. 7.)

1925. *Olenecamptus biocellatus* Schwarzer, Ent. Blätt, XXI, p. 63. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 557, fig. 576.

1933. *Dorcaschema biocellatum* Schwarzer. Matsushita, Journ. Fac. Ag. Hok. Imp. Uni., XXXIV, p. 353, pl. 3, fig. 6.

Distinguished at once by the large, ocellated, glabrous macula at middle of each elytron.

Male. Elongate-oblong, rather slender, cylindrical; black, entirely dark gray pubescent, with black markings as follows: head with three vittae, one medially and one behind isthmus of each eye. Pronotum with three vittae, one medially, narrowed apically and basally, one laterally above procoxae. Scutellum densely, whitish tomentose. Each elytron with humerus black, and with five black maculae disposed in this manner: two small, round, at basal quarter in a transverse row (the first in center of disk and second almost to lateral margin), the third at middle largest, rounded, ocellated, slightly lateral, the fourth and fifth in a transverse row, elongate, and in same position as first two, the lateral one being the larger. Beneath black, densely covered with gray pubescence. Legs black, tarsi (including claw segment) reddish-brown, entirely gray pubescent. Antennae with basal three or four segments piceous, the remaining segments dark reddish-brown, thinly clothed with fine, gray pubescence.

Head above finely alutaceous, front strongly transverse, surface not at all asperate, but very minutely, sparsely punctate with a few very fine rugosities; clypeal margin elevated, notched medially; eye with lower lobe very large, strongly widened posteriorly, lower margin strongly oblique; antennal tubercles prominent, well separated, obtusely produced at apex. Pronotum

slightly transverse; apex little wider than base; disk with basal and apical sulcus, a small, feebly elevated tubercle just anterior to basal sulcus and slightly more apical either side a large tumescence, entire disk finely transversely rugose. Scutellum transverse, sides broadly arcuate, apex moderately rounded. Elytra with sides feebly attenuate, apices with sutural margin feebly obliquely truncate, not dentate at tip; entire surface with coarse, deep, well-spaced punctures. Mesosternal process not elevated medially, apical margin truncate. Legs with femora robust, clavate; mesotibiae with a short process at apex on mesal surface. Antennae two and one-half times body length; scape nearly attaining apex of pronotum, on dorsal surface basal one-third rugose and impressed longitudinally at middle, apical two-thirds sparsely asperate, remainder of surface densely, finely punctate; third about two and one-half times length of scape, fourth shorter than scape, fifth slightly longer than third, remaining segments subequal to fifth except eleventh which is distinctly longer than tenth; beneath densely ciliated with very short, fine hairs.

Female. More robust; elytra slightly widened behind middle; fifth sternite with a short median impressed line at base, apex broadly emarginate; antennae twice body length, basal six segments not ciliate beneath; mesotibiae unarmed.

Length 9.5–11.5 mm.; width 2–2.6 mm.

Type locality: Kankau, Formosa.

Distribution.—Formosa.

FORMOSA: 10♂, 2♀; Kuraru, Aug. 12, 1934 (L. Gressitt) [L. Lacey; CAS]. 2♀; Kankau (Koshun), Apr. 1912 (H. Sauter) [both paratypes, BMNH; USNM].

Microlenecamptus signatus Aurivillius (Pl. IX, fig. 19.)

1914. *Cylindrepomus signatus* Aurivillius, Ark. Zool., VIII, (29), p. 25.
1940. *Microlenecamptus signatus* Aurivillius. Breuning, Nov. Ent., suppl. 3, I, p. 560, fig. 580.

Particularly in the form of its elytral markings, this species resembles certain members of the genus *Cyllene* in its coloration.

Male. Elongate-ovate, robust; black, sparsely covered with fuscous pubescence, maculate with grayish-white tomentum as follows: front and sides of head sparsely covered; pronotum margined rather broadly at base, except at extreme middle; scutellum entirely covered; elytra each with an ovate macula near middle of base, and with three lines on disk, first from basal quarter laterally, obliquely arcuate to behind middle of suture, narrowly interrupted, second obliquely arcuate from near suture at apical two-fifths to apical quarter laterally, and third from apical quarter following close to suture posteriorly, recurved laterally before apex, forming a "U," with the outside arm slender; apex sparsely covered, below humerus a macula and a short line at middle on side. Body beneath and legs black, sparsely pale

gray pubescent; sternum and abdomen more densely whitish laterally; protibiae beneath and protarsi laterally densely fringed with long, whitish hairs. Antennae piceous, sparsely gray-white pubescent, beneath with a fringe of whitish hairs, darker and longer at apices of segments, especially of third to fifth.

Head and pronotum finely alutaceous; antennal tubercles with a short, broad tooth at apex. Pronotum a little broader than long; transverse sulci broad, basal one a little deeper; disk nearly smooth. Elytra nearly parallel-sided, apices each with a broad, slightly oblique truncature near suture; disk coarsely punctate, punctures finer apically. Fifth sternite one and a half times as long as fourth, apex emarginate. Mesotibiae with a long process at apex on inner side. Antennae two and a half times as long as body, fringed beneath; scape somewhat scabrose above, one-half length of vertex; remaining segments smooth, more than three times as long as scape, distinctly longer than fourth, gradually longer to seventh, thence gradually, feebly shorter again.

Female. As male but the pronotum more transverse, one-fourth wider than long, elytra parallel-sided; fifth sternite longer than third and fourth together, broad; antennae shorter, the fourth segment much shorter than third, fifth shorter than fourth or sixth [rest wanting]; protibiae and protarsi not fringed, mesotibiae unarmed.

Length 9.5–13 mm.; width 2.3–3.5 mm.

Type in Reichsmuseum of Stockholm.

Type locality: "Tonkin, Laos."

Distribution.—Southeastern Asia.

French Indo-China: ♂, ♀; Tonkin [RNS—type ♂; MRHNB—♂, ♀]. Burma: ♂; Okkyi, Shwegu, May 29, 1919 [BMNH].

Microlenecamptus albonotatus Pic (Pl. IX, fig. 20.)

1925. *Cylindropomus* (*Microlenecamptus*) *albonotatus* Pic, Mél. Exot. Ent., xliii, p. 22.

1940. *Microlenecamptus albonotatus* Pic. Breuning, Nov. Ent., suppl. 3, i, p. 560, fig. 581.

"Elongate, black, gray pubescent, above and below white notate, scutellum white; thorax short, sinuate, posteriorly white marginate. Elytra rather short, apices shortly acute, anteriorly and at middle white bimaculate, behind middle and before apex with white arcuate fasciae. Legs short. 13 mm. *Tonkin.*

"Closely related (from the description) to *signatus* Aurivillius. This species, remarkable by the form of its very short prothorax which is not longer than the head, and by its short legs, by which characters it is placed in a new subgenus which I call *Microlenecamptus.*" (Translation of the original description.)

CYLINDRECAMPTUS Breuning

1940. *Cylindrecamptus* Breuning, Nov. Ent., suppl. 3, I, p. 560.

Distinct from all the other genera in having the fourth segment of the antennae slightly longer than the third.

Elongate, rather robust, cylindrical. Head with front transverse; eye with lower lobe broadly subtriangular; antennal tubercles well separated. Pronotum slightly transverse (♀). Elytra feebly widened behind middle; apices separately narrowly rounded and subtruncate. Legs short, hind ones feebly longer; femora robust, clavate. Antennae shortly, heavily fringed beneath on third and fourth segments; scape rather long; third nearly three times as long as first; fourth slightly longer than third (rest wanting).

Genotype: *Cylindrepomus lineatus* Aurivillius, by monotypy.

Cylindrecamptus lineatus Aurivillius (Pl. IX, fig. 18.)

1914. *Cylindrepomus lineatus* Aurivillius, Ark. Zool., VIII, (29), p. 25.
1940. *Cylindrecamptus lineatus* Aurivillius. Breuning, Nov. Ent., suppl. 3, I, p. 561.
1922. *Olenecamptus interruptus* Pic, Mél. Exot. Ent., XXXVII, p. 14 [new synonymy].
1940. *Cylindrecamptus lineatus* ab. *interruptus* Pic. Breuning, Nov. Ent., suppl. 3, I, p. 561.

Female. Elongate-ovate, rather robust; black, finely fuscous pubescent, with ashy-white vittae as follows: head with a fine one each side of middle above, arcuately convergent anteriorly, continued entirely across pronotum, where each is much broader, thence prolonged along pronotal base to the lateral vitta. Scutellum ashy-white. Elytra each with three discal vittae, one near suture from basal fifth, before apex briefly interrupted, then continued by a much broadened section which curves around to the side margin, second short, mid-basal, third near side of disk, extending from basal quarter to apical fifth, broadly interrupted behind middle; beneath humeri a very short, fine vitta. Body beneath black, sparsely cinereous pubescent (as is front of head), sides rather indistinctly, broadly, ashy-white vittate from below eye to tip of abdomen, on the abdominal sternites more or less broken into maculae.

Head densely, strongly alutaceous (as are the pronotum and elytra); antennal tubercles robust, prominent, briefly dentate at apex. Pronotum distinctly broader than long, sides constricted before base; basal transverse sulcus deep, apical one broad, shallow; disk without transverse rugosities. Scutellum transverse. Elytra slightly expanded to apical quarter, apices truncate, subrotund; disk rather coarsely, not densely punctate, a little more finely so beyond apical third.

Length 10 mm.; width 2.5 mm.

Type in the National Museum of Sweden.

Type locality: "Tonkin, Laos" (*lineatus*); Tonkin (*interruptus*).

Distribution.—Laos.

FRENCH INDO-CHINA: ♀; Tonkin, Laos [RNS—type].

DORCASCHEMA Le Conte

1852. *Dorcaschema* Le Conte, Journ. Acad. N. Sci. Phila., (2), II, p. 147. Thomson, Syst. Ceramb., 1864, p. 72. Lacordaire, Gen. Col., IX, 1872, p. 457, 459. Le Conte and Horn, Class. Col. N. Am., 1883, p. 320. Leng and Hamilton, Trans. Amer. Ent. Soc., XXIII, 1896, p. 110. Blatchley, Col. Ind., 1910, p. 1065. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 561.

This genus and *Hetoemis* differ from all the Old World genera in the shape of the eye, its lower hind angle being rounded and obtuse; the pronotum is never strongly elongate; the antennae are never fringed nor serrate beneath, the third segment is not scabrose in male; and legs are unarmed in male.

Elongate-oblong, cylindrical, slender. Head with front transverse; eye with lower lobe widest at middle, its posterior angle rounded, less than 90°, antennal tubercles subapproximate at base, robust, armed at apex in male. Pronotum subquadrate or feebly elongate in male, feebly transverse in female; disk transversely rugose. Elytra with sides feebly widened behind middle; apices rounded; disk punctate (in *wildii* granulate-punctate at base). Mesosternum with its process truncate or feebly emarginate at apex. Fifth abdominal sternite as long as third and fourth together in female, a little shorter in male. Legs subequal, the hind ones occasionally a very little longer; femora robust, gradually clavate; protibiae and protarsi fringed with long hairs in male. Antennae two or two and one-half times as long as body in male, about one and one-half times in female, not serrate nor fringed beneath in either sex; third segment two and one-half to four times as long as scape, fourth and fifth subequal; eleventh elongate in male.

Genotype: *Saperda alternata* Say, designated by Thomson.

Key to Species

1. Elytra with very sparse, coarse punctures; base granulate-punctate; large, 14–20 mm.....*wildii*
   Elytra densely punctate, base not granulate-punctate; small, 6–13 mm....2
2. Body color black, pubescence entirely gray.....*nigrum*
   Body color reddish-brown, gray pubescent, with fulvous or tawny forming vittae.....*alternatum*

Dorcaschema wildii Uhler (Pl. XIV, fig. 8.)

1855. *Dorcaschema wildii* Uhler, Proc. Acad. Nat. Sci. Phila., VII, p. 417. Horn, Trans. Amer. Ent. Soc., XII, 1885, p. 194. Leng and Hamilton, Trans. Amer. Ent. Soc., XXIII, 1896, p. 110. Blatchley, Col. Ind., 1910, p. 1065. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 562.

This is by far the largest member of the genus and, in addition, the elytral disk is granulate-punctate at base, the punctures sparse and widely separated. It appears to be rather rare in collections.

Male. Elongate-oblong, rather robust, cylindrical; head and pronotum piceous to dark reddish-brown, elytra dark to light reddish-brown; all over ashy-fulvous pubescent and marked as follows: head with front and sides having irregular patches of cinereous pubescence, and behind isthmus a narrow, bright fulvous vitta which is wider basally; occiput with a narrow, elongate, triangular, glabrous macula at base. Pronotum laterally with a broad, cinereous vitta upon which medially is superimposed a narrow, bright fulvous vitta (a continuation of that on the head); disk medially with a narrow, glabrous vitta which is somewhat irregular along its lateral margins, not attaining the apex of the pronotum; either side at base of disk and laterally with glabrous punctures. Elytra each with a broad, cinereous vitta laterally from humerus to apex, upon which is superimposed a narrow, bright fulvous vitta that is more or less broken and indistinct basally; behind middle on the vitta is a more or less glabrous, transverse macula, which usually has a few, minute, bright fulvous maculae on its surface; disk with small, scattered, rounded, glabrous maculae. Beneath piceous to reddish-brown, rather densely clothed with ashy-fulvous pubescence, on sterna interspersed with irregular, cinereous patches; laterally with small, rounded, glabrous maculae. Legs piceous to reddish-brown, ashy-fulvous pubescent, with scattered, irregular patches of cinereous, and small, rounded, glabrous maculae; the tarsi ashy-pubescent but integument not lighter in color than legs. Antennae with scape and third segment dark to light reddish-brown, the remaining segments lighter reddish-brown and extreme apices piceous; entirely thinly clothed with cinereous pubescence.

Head above transversely rugose (rugosities slightly oblique) or punctate; front with surface scabrose; genae and sides of head with coarse punctures; eye with lower lobe transverse, front margin rounded, only feebly widened behind. Antennal tubercles subapproximate, with a short, robust tooth at apex. Pronotum subquadrate, apical margin feebly emarginate; apex narrower than base, middle widened but not as wide as base; apical and basal sulci broad, shallow; disk transversely rugose, at base either side of middle a few coarse punctures. Scutellum transverse, sides and apex broadly arcuate. Elytra gradually attenuate; apices subtruncate; disk with moderate-sized punctures and scattered over disk are a very few, coarse, deep punctures, forming the glabrous maculae. Mesosternum and mesosternal side-pieces finely carinate; mesosternal process narrow and subtruncate apically,

at base feebly elevated medially; fifth sternite about as long as third and fourth together, at apex attenuate (but not so much as usual in this tribe) and apically truncate. Procoxae feebly flanged on outer margin; protibiae dilated and fringed. Antennae about two times body length; scape reaching beyond middle of head, strongly asperate dorsally and more or less depressed; third nearly four times length of scape; coarsely punctate on basal quarter; remaining segments subequal, except eleventh, which is distinctly longer than tenth.

Female. More robust; slightly widened behind middle; antennae one and one-third to one and one-half times body length; eleventh segment only very slightly longer than tenth; fifth sternite broad, only feebly attenuate, apex emarginate, medially depressed at base; protarsi not dilated or fringed; procoxae not flanged.

Length 14.5–20.5 mm.; width 3.5–5.5 mm.

Type locality: Baltimore.

Distribution.—From Massachusetts south and west to Kentucky.

MASSACHUSETTS: ♂; Plymouth Co. [CU]. PENNSYLVANIA: 5♂, 16♀; no locality data [CNHM—♂, 14♀; CU—3♂, ♀; RPM—♀; MRHNB—♂]. 2♂, 2♀; Frankfort, July 2 [RPM]. 2♂, 2♀; Dauphin Co., June 21, 1895 [RPM]. ♂; West Chester, July 4 (J. C. Bradley) [CU]. 3♂, 2♀; Germantown, July 1910 [CNHM—♂; ANSP—2♂, 2♀]. ♀; Tioga Co. [CNHM]. ♀; Mt. Airy, July 4 [CNHM]. ♂, ♀; Hummelstown, Aug. 3, 1915 (Knull) [ANSP].

OHIO: ♂; no locality data [KU]. KENTUCKY: 2♂; no locality data [RPM; KU].

Host.—Breeds in mulberry (*Morus*).

Dorcaschema alternatum alternatum Say (Pl. XIV, fig. 9.)

1823. *Saperda alternata* Say, Journ. Acad. Nat. Sci. Phila., III, p. 405; Lec. ed., 1859, p. 188.

1852. *Dorcaschema alternatum* Say. Leconte, Journ. Acad. Nat. Sci. Phila. (2), II, p. 147. Lacordaire, Gen. Col., IX, 1872, p. 460. Horn, Trans. Amer. Ent. Soc., XII, 1885, p. 194. Leng and Hamilton, Trans. Amer. Ent. Soc., XXIII, 1896, p. 110. Blatchley, Col. Ind., 1910, p. 1065. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 562.

While somewhat similar to the foregoing, this species is easily distinguished by its small size, the simple, denser punctation of elytra, and its different coloration.

Male. Elongate-oblong, slender, cylindrical; reddish-brown to nearly fuscous, elytra usually a little paler; entirely covered with sparse, dull, hoary-gray pubescence (in western examples pubescence slightly brighter and denser) and with pale yellow pubescent markings as follows (in western

specimens these may approach orange-ochraceous) : head with four indistinct vittae above, one each side of middle and one behind each eye; eyes more or less margined; genae and sides of head largely yellow pubescent. Pronotum with a double vitta at middle (often obsolete), separated by a glabrous line, and one each side of disk. Scutellum in part yellow. Elytra each with base yellowish, and disk with four rows of irregular maculae, the two outer ones interrupted at apical third by a short, transverse, glabrous band, the maculae often coalescent. Body beneath reddish-brown, covered with variegated hoary and yellow pubescence, interrupted irregularly by glabrous punctures. Legs reddish-brown, hoary pubescent. Antennae light reddish-brown, very sparsely pubescent (except in western specimens) ; scape usually darker.

Head subscabrose, coarsely, sparsely punctate; front coarsely, rather densely granulate; eye with lower margin arcuate; antennal tubercles robust, divergent, subapproximate, prominent, minutely armed at apex. Pronotum a little longer than wide; at base feebly wider than apex, sides slightly constricted before middle, near apex, and near base; disk medially finely, transversely rugose, rugosities laterally largely replaced by coarse, sparse punctures and low asperities; basal and apical transverse sulci distinct. Scutellum short, transverse, sides nearly parallel, apex broadly rounded. Elytra very feebly widened behind middle, thence narrowed to apices, which are separately rounded; disk coarsely, irregularly punctate, more finely so behind middle, except on the lateral glabrous band. Mesosternum rather rugose, anteriorly with a low, transverse tubercle, process with sides tapering, its apex feebly rounded or subtruncate; fifth sternite distinctly longer than fourth, apex shallowly emarginate. Procoxae with a feeble tubercle. Antennae more than twice length of body; scape reaching to middle of vertex, coarsely, densely asperate above; third segment three times as long as first, smooth; fourth much shorter, rest gradually longer, eleventh greatly elongate, arcuate.

Female. More robust than male; pronotum often slightly transverse; elytra more strongly expanded behind middle; fifth sternite as long as third and fourth together, with a median impressed line; legs less elongate; antennae about one and two-thirds times as long as body, segments from fourth gradually shorter, eleventh longer than tenth, however.

Length 7–13 mm.; width 2–3.7 mm.

Type locality: United States.

Distribution.—Eastern United States, west to Arkansas and part of Texas.

MASSACHUSETTS: 2♂; Plymouth Co. [CU]. NEW YORK: ♀; Staten Island, July 15, 1915 [L. Lacey]. ♀; Pike [CNHM]. PENNSYLVANIA: ♂; West Chester [CU]. 5♂, 3♀; Dauphin Co., June 21, 1896 [RPM]. 2♂, 2♀; no locality data [MRHNB—♂; CNHM—♂, 2♀]. 2♀; South Philadelphia (H. B. Kirk) [CNHM]. 7♂, 5♀, Hummelstown, June–Aug. [ANSP]. ♀; Mt. Airy, July 7 [ANSP]. 5♂, 2♀; no locality data [ANSP].

MARYLAND: 2♀; no locality data [Mina. U.]. ♀; Chestertown, July 30, 1901 (Vanatta) [ANSP]. DISTRICT OF COLUMBIA: ♂; Washington [ANSP]. NORTH CAROLINA: ♀; no locality data [L. Lacey]. FLORIDA: ♀; Enterprise, May [RPM]. ♂; no locality data [L. Lacey]. OHIO: 2♀; Woodville, July 14, 1915 [Mina. U.]. ♂; Cedar Pt., July 9, 1915 [Mina. U.]. ILLINOIS: ♂; Edgebrook, July 9, 1904 [CNHM]. 7♂, 2♀; Chicago, Apr. 1893 [CNHM]. TENNESSEE: ♂; Lookout Mountain [Mina. U.]. KENTUCKY: ♀; no locality data [CU]. MINNESOTA: 2♂; Olmstead Co. [Mina. U.]. IOWA: ♀; Ames; June 20, 1932 (J. F. Glawe) [Tex. Ag.]. ARKANSAS: ♀; no locality data [L. Lacey]. KANSAS: 3♂, 5♀; Cherokee Co., 886 ft. (R. H. Beamer). 2♂, 3♀; Douglas Co. 11♂, 17♀; Bourbon Co., 800 ft. (R. H. Beamer). 3♀; Montgomery Co. ♂; Lawrence (G. H. Vansell). 2♂, ♀; Sumner Co. ♂; Cove, June 20, 1928 (R. H. Beamer). ♂, ♀; Rice Co., July, 1923 (R. H. Beamer). ♂; Cowley Co. [All KU]. ♂; Wakefield, Clay Co., June 26 (J. C. Warren) [ANSP]. MISSOURI: 3♂, 2♀; no locality data [Mina. U.]. MICHIGAN: ♀; no locality data [MRHNB]. SOUTH DAKOTA: ♀; Black Hills [Mina. U.]. TEXAS: ♂, 2♀; no locality data [ANSP—2♀; MRHNB—♂]. 2♂; 2♀; no locality data [L. Lacey].

Dorcaschema alternatum octovittata Knull (Pl. XIV, fig. 10.)

1937. *Dorcaschema octovittata* Knull, Ohio Journ. Sci., XXVII, p. 307.

Quite similar in all respects to the nymotype but constantly differs from the nymotype as follows:

Entire body covered rather densely with bright hoary or silvery gray pubescence, the markings above light orange; the maculae on elytra coalesced to form regular lines; the glabrous line at middle of pronotal disk nearly obsolete.

Type locality: Davis Mts., Texas.

Distribution.—Known only from Texas.

TEXAS: 3♂, 3♀; Brownwood, May 11, 1919 [AMNH]. ♂; (paratype) Davis Mts., July 3, 1936 (J. N. Knull) [L. Lacey]. ♀; Frisco, July 12, 1935 [Tex. Ag.]. 2♀; Austin, April 28, 1932 [Tex. Ag.; CU]. 5♂, 6♀; College Station, April to Sept. (H. J. Reinhard) [Tex. Ag.] ♂; Mexia, Oct. 5, 1937 [Tex. Ag.]. 3♂; Kingsville [CU]. ♂; 2♀; no locality data [ANSP]. ♀; Davis Mts., July 2, 1940 (D. J. & J. N. Knull) [L. Lacey]. 2♀; Galveston (R. Hopping) [CNHM].

Dorcaschema nigrum Say (Pl. XIV, fig. 11.)

1827. *Saperda nigra* Say, Journ. Acad. Nat. Sci. Phila., (1), v, p. 272; Leconte ed., complete writings, 1859, p. 330.

1852. *Dorcaschema nigrum* Say. Leconte, Journ. Acad. Nat. Sci. Phila., (2), II, p. 147. Horn, Trans. Amer. Ent. Soc., XII, 1885, p. 194.

Hamilton, Can. Ent., XXII, 1890, p. 239. Leng and Hamilton, Trans. Amer. Ent. Soc., XXIII, 1896, p. 110. Blatchley, Col. Ind., 1910, p. 1065, 1066. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 562.

This species is readily distinguished by its uniform dark gray coloration and its small size.

Male. Elongate-oblong, rather slender, cylindrical; black or piceous. All over thinly clothed with sparse, brownish-black pubescence, except on front and sides of head which are usually thinly, dark gray pubescent. Beneath piceous or black, thinly dark gray pubescent; legs piceous or very dark reddish-brown, thinly gray pubescent. Antennae black or piceous, sometimes paler on apical segments.

Head above and front finely rugose; eye with lower lobe transverse, front margin straight, feebly oblique, lower margin strongly arcuate, the widest part of eye at middle; antennal tubercles prominent, subcontiguous at base, apically with a strong, robust tooth. Pronotum subquadrate, apical margin feebly emarginate medially and narrower than base; apical and basal sulci wide and moderately deep, apical one curved medially; sides widened medially; disk with surface finely, transversely rugose. Scutellum transverse; sides and apex broadly arcuate. Elytra feebly widened behind middle, apices separately, broadly arcuate; surface of disk finely rugose, with well-spaced, coarse, deep, rounded punctures over entire disk. Mesosternal process narrow, emarginate at apex. Entire undersurface finely rugose; fifth sternite attenuate, broadly rounded at apical margin. Procoxae feebly flanged on outer margin; legs finely rugose; protibiae and protarsi with a fringe of long hairs. Antennae nearly twice length of body, scape reaching beyond middle of head, strongly asperate on upper surface; third segment two and one-half times length of scape, feebly asperate on dorsal surface; fourth segment one-fifth shorter than third, remaining segments subequal, except eleventh which is much longer than tenth.

Female. More robust; elytra more strongly widened behind middle; fifth sternite broad, at apex strongly emarginate; with an impressed line medially; protibiae and protarsi less heavily fringed; antennae about one and two-thirds times as long as body.

Length 6.6–9.5 mm.; width 1.6–2.5 mm.

Type locality: United States.

Distribution.—Eastern United States as far west as Texas.

NEW YORK: ♂, ♀; no locality data [CU]. NEW JERSEY: ♀; High Point, July 12, 1937, alt. 1877 ft. (L. L. Pechuman) [CU]. PENNSYLVANIA: 3 ♂; no locality data [KU—♂; CNHM—♂; ANSP—♂]. ♀; Philadelphia, June 12 [RPM]. ♂, 5 ♀; Dauphin Co., June 20–29, 1890–95 [RPM]. ♀; Pittsburgh [CNHM]. ♂; Hummelstown, May 25 (Knull) [ANSP]. MARYLAND: ♂, ♀; no locality data [Mina. U.]. OHIO: ♂, 2 ♀; no locality data [RPM—♀; ANSP—♂, ♀]. VIRGINIA: 2 ♂; no locality data [ANSP]. ILLINOIS: ♀; no locality data [Mina. U.]. ♂, 2 ♀: Northern Ill. [Mina. U.].

2♂, 3♀; Edgebrook, June 29, 1914 [CNHM—♂; ANSP—♂, 3♀]. ♂, ♀; Willow Springs, June 10–15 (Gerhard) [CNHM]. 2♀; Glen Ellyn, May 30, 1903 (Kenkil) [CNHM].

KANSAS: 2♂; Montgomery Co., 798 ft.; 1916 (R. H. Beamer) [KU]. ♂, 2♀; Douglas Co. [KU]. MICHIGAN: ♀; no locality data [CNHM]. MINNESOTA: ♀; Washington Co.; May 20, 1939 (H. T. Peters) [Mina. U.]. ♀; Winnebago Cr., 3–4 m. N. E. Eitzen, Houston Co., May 31, 1941 (John M. Hughes) [Mina. U.]. WISCONSIN: ♀; no locality data [CNHM]. TEXAS: ♂; Lee Co. (Birkmann) [CNHM]. No locality data: 3♀ [Mina. U.—2; CU—1]. MEXICO (?): ♀; no locality data [ANSP].

HETOEMIS Haldeman

1847. *Hetoemis* Haldeman, Trans. Amer. Phil. Soc., x, p. 54. Le Conte, Journ. Acad. Nat. Sci. Phila., (2), II, 1852, p. 146. Le Conte and Horn, Class. Col. N. Am., 1883, p. 320. Blatchley, Col. Ind., 1910, p. 1063, 1066. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 563.

This genus is rather close to *Dorcaschema* in most of its details, but is readily distinguished by the acuminate elytra and by the shape of the eye.

Elongate-oblong, slender, cylindrical. Head with front transverse; antennal tubercles subapproximate basally, armed apically in both sexes; eyes with lower lobe anteriorly angled, posteriorly rounded, widest posteriorly. Pronotum transverse or subquadrate; disk finely transversely rugose. Elytra with apices acuminate, the angle being at the suture; disk punctate. Mesosternal process elevated longitudinally, apically finely emarginate; fifth sternite as long as third and fourth together in male; slightly longer in female. Legs subequal in length; femora gradually clavate, robust; protibiae and protarsi fringed in male. Antennae two to two and one-half times body length in male, about one and one-half times in female, not fringed nor serrate beneath; third segment three times as long as first, not scabrose; fifth segment feebly longer than fourth in both sexes, eleventh slightly elongate in male.

Genotype: *Saperda cinerea* Olivier, by monotypy.

Hetoemis cinerea cinerea Olivier (Pl. XIV, fig. 12.)

1795. *Saperda cinerea* Olivier, Ent., IV, (68), p. 28, pl. 3, fig. 35.
1852. *Hetoemis cinerea* Olivier. Le Conte, Journ. Acad. Nat. Sci. Phila., (2), II, p. 146. Leng and Hamilton, Trans. Amer. Ent. Soc., XXIII, 1896, p. 111. Blatchley, Col. Ind., 1910, p. 1066. Breuning, Nov. Ent., suppl. 3, I, 1940, p. 563.
1827. *Saperda trilineata* Say, Journ. Acad. Nat. Sci. Phila., (1), V, p. 273.
1847. *Hetoemis juglandis* Haldeman, Trans. Amer. Phil. Soc., (2), X, p. 54.

This species can only be confused with *Dorcaschema nigrum;* it is

at once distinct in its larger size, in having paler gray and denser pubescence, and in the elytra being acuminate at apex.

Male. Elongate-oblong, slender, cylindrical; head and pronotum piceous to black, elytra black to dark reddish-brown (usually black); all over densely gray pubescent. Head with an elongate, triangular macula on occiput and a narrow vitta behind isthmus, black. Pronotum with a median vitta, which is widest basally, not attaining base or apex, a small, round macula on side, below this a narrow, oblique vitta to procoxae, all black. Elytra with humeri black; scutellum frequently with a median vitta of same color. Beneath black or piceous, densely clothed with gray pubescence. Legs black or piceous, densely gray pubescent. Antennae with scape and third segments dark reddish-brown or piceous (sometimes fourth same color) and moderately clothed with gray pubescence, the remaining segments lighter (to light reddish-brown) but with the extreme apices piceous.

Head above and front with coarse, somewhat rugose punctures; front not asperate; antennal tubercles robust, prominent, well-separated, with a small but robust tooth at apex. Pronotum subquadrate or feebly transverse, base and apex subequal, widest medially; basal and apical sulci wide and shallow; disk medially finely transversely rugose, remainder of surface with coarse, well-spaced punctures. Scutellum slightly transverse, sides and apex arcuate. Elytra gradually attenuate posteriorly; apices acuminate; entire disk densely punctate, the punctures not distinct through the pubescence. Mesosternal process strongly narrowed, minutely emarginate at apex, with an elongate, feeble elevation medially at base. Fifth sternite about as long as or slightly longer than third and fourth together, strongly narrowed apically; apex subtruncate. Protibiae and femora not serrate. Antennae about two and one-half times body length; scape reaching slightly beyond middle of head, strongly asperate on dorsal surface; third nearly three times length of scape, not serrate; fifth segment slightly longer than fourth; eleventh segment nearly twice length of tenth.

Female. More robust, slightly widened behind middle; antennae about twice body length; fifth sternite with a median line reaching from base to middle, either side of middle a broad, shallow impression which is more or less oblique.

Length 8–12 mm.; width 2–2.7 mm.

Type locality: America septentrionale (*cinerea*); United States (*trilineata*).

PENNSYLVANIA: 2♂; no locality data [Mina. U.—♂; CNHM—♂]. 2♂, 3♀; Dauphin Co., June, 1890 and 95 [RPM]. ♂; Chester Co., July 5, 1920 (Ernest Baylis) [RPM]. ♂; Castle Rock, June 18, 1922 (Ernest Baylis) [RPM]. ♀; South Philadelphia, June 14 [ANSP]. ♂; Harrisburg (W. S. Fisher) [CNHM].

MARYLAND: ♂; no locality data [Mina. U.]. NORTH CAROLINA: ♂; Raleigh, May 20, 1940 [Mina. U.]. OHIO: 2♀; Old Fort, June 24, 1915

(H. C. Yingling) [Mina. U.]. ILLINOIS: ♂, ♀; Northern Illinois [Mina. U.—♀; CNHM—♂]. ♂; Rock Island [Mina. U.]. 6♂, 6♀; Edgebrook, June 14–September 6 [CNHM—5♂, 5♀; RPM—♂, ♀]. 2♀; Cook Co. [CNHM]. 9♂, 3♀; Willow Springs, July 2–30 [CNHM].

MICHIGAN: 2♂, ♀; no locality data [CNHM]. INDIANA: ♂; Winona Lake, June 28, 1936 (F. E. Holley) [CNHM].

No locality data: ♂, 2♀ [Mina. U.—2♀; MRHNB—♂].

Hetoemis cinerea bimaculata new subspecies (Pl. XIV, fig. 13.)

As in the nymotype but differs in having the integumental color black to light reddish-brown; the cinereous pubescence less dense; the elytra each bear a small, rounded dark macula just behind middle of disk and the discal punctation is much stronger; the antennae in the apical segment are only very slightly lighter in color than the proximal ones; and are usually piceous or dark reddish-brown.

Holotype.—Male; Montgomery Co., Kansas, 798 ft., 1915 (R. H. Beamer) [KU].

Allotype.—Female; topotypic (R. H. Beamer) [KU].

Paratypes.—2 males, 2 females; topotypic (R. H. Beamer) [KU]. 2 males, 2 females; Douglas Co., Kansas, June 19–24, 1919–1920 (W. E. Hoffman) [KU]. Male; Cowley Co., 1114 ft., 1916 (R. H. Beamer) [KU]. Female; Bourbon Co., 800 ft., 1915 (R. H. Beamer) [KU]. Male, two females; Missouri [Mina. U.]. Male, female; Olmstead Co., Minnesota (C. N. Ainslie) [Mina. U.]. Female; no locality data [MRHNB].

Incertae Sedis

DORCASCHESIS Heller

1924. *Dorcaschesis* Heller, Ent. Mitt., XIII, p. 199.

"Head as wide as long, between antennal tubercles broadly subconcave; genae as tall as lower lobe of eye. Antennae one and a half times longer than body, scape subfusiform, one-third length of third segment. Prothorax as wide as long, not transversely rugose, sides broadly rounded, with a basal and apical transverse sulcus. Scutellum semicircular. Elytra on disk slightly depressed, two and one-half times longer than broad, apices emarginate, spinose. Legs rather elongate, front ones not longer than others; femora clavate, metafemora attaining apex of fourth sternite; pro- and mesotibiae straight, obliquely sulcate; metatarsi with first segment very long, longer than the other tarsi. Procoxal cavities angulate, mesocoxal cavities open. Pro- and metasternum slightly declivous (broader than in

Dorcaschema). Metepisterna very narrow. Anal sternite longer than preceding.

"Between *Cylindrepomus* and *Dorcaschema;* from the first separated by structure of antennal tubercles, from the latter by the not elongate protarsi and the short pronotum, distinguished from both by the strongly elongate metatarsal first segment, and by the emarginate elytral apices." (Translation of the original description.)

Genotype: *Dorcaschesis sericata* Heller, by monotypy.

Dorcaschesis sericata Heller

1924. *Dorcaschesis sericata* Heller, Ent. Mitt., XIII, p. 199.

"Black, prothorax, pro- and metasternum and coxae and femora, except apical black part, red, all covered with fine silky tomentum, antennae, lateral vitta on thorax, tibiae (almost entirely) and tarsi black. Elytra on basal half near suture and between humeri longitudinally impressed, posteriorly confluently, rather coarsely punctate, behind middle more sparsely so; body beneath impunctate. Length 6 mm.; width 2.1 mm. Luzon: Mt. Banahao.

"Black, except antennae, tibiae and tarsi, with gray silky tomentum; pronotum, pro- and metasternum, as well as basal half of femora, blood-red; pronotum slightly broader than long, sides rounded, with an apical and basal transverse sulcus. Elytra on basal half with a longitudinal impression along suture and one near humeri, uniting posteriorly, densely punctate, bordering a weak longitudinal carina on basal third, in addition on the sides with three longitudinal rows of finer, more spaced punctures bearing minute, thornlike bristles. Sutural stripe only district on posterior half. Outer angle of the apical emargination of elytra longer than the inner." (A translation of the original description.)

Explanation of Figures

Plate IX

Cylindrepomus

Fig. 1.—*C. grammicus grammicus* Pascoe. Batjan Island. × 3.5.
Fig. 2.—*C. grammicus oxypterus* Fairmaire. New Britain. × 3.5.
Fig. 3.—*C. grammicus hecate* new subspecies. Guadalcanal Island. × 3.5.
Fig. 4.—*C. grammicus marshalli* new subspecies. Admiralty Islands. × 3.5.
Fig. 5.—*C. rubriceps* Aurivillius. Palabuan, Java. × 4.2.
Fig. 6.—*C. aureolineatus* new species. Mt. Marinjak, Sarawak. × 2.8.
Fig. 7.—*C. ledus* new species. Boeroe Island. × 4.
Fig. 8.—*C. nigrofasciatus nigrofasciatus* Blanchard. Astrolabe Bay, New Guinea. × 4.5.
Fig. 9.—*C. peregrinus peregrinus* Pascoe. Palabuan, Java. × 4.
Fig. 10.—*C. peregrinus samarensis* new subspecies. Samar, P. I. × 4.
Fig. 11.—*C. laetus laetus* Pascoe. Perak, Malay Peninsula. × 4.5.
Fig. 12.—*C. laetus shelfordi* Aurivillius. Mantang, Sarawak, Borneo. × 4.5.
Fig. 13.—*C. comis* Pascoe. Sarawak, Borneo. × 6.9.
Fig. 14.—*C. astyochus* new species. Palawan, P. I. × 3.5.
Fig. 15.—*C. biconjunctus* Breuning. × 3. (After Breuning & de Jong.)
Fig. 16.—*C. sexlineatus* Schultze. Davao, Mindanao, P. I. × 4.
Fig. 17.—*C. atropos* new species. Samar, P. I. × 3.5.
Fig. 18.—*Cylindrecamptus lineatus* Aurivillius. Laos, Tonkin. × 5.
Fig. 19.—*Microlenecamptus signatus* Aurivillius. Tonkin. × 5.
Fig. 20.—*M. albonotatus* Pic (after Breuning). × 4.5.
Fig. 21.—*Macrocamptus virgatus* Gahan. Sikkim, India. × 2.5.
Fig. 22.—*M. andamanicus* Gardner. Andamans Islands. × 3.

Plate X

Olenecamptus bilobus. × 3

(The outline figures represent the humeral stripe enlarged)

Fig. 1.—*O. b. bilobus* Fabricius. Queensland.
Fig. 2.—*O. b. strucki* new subspecies. Astrolabe Bay, New Guinea.
Fig. 3.—*O. b. dahli* Kriesche. Iboki, New Britain.
Fig. 4.—*O. b. ternatus* new subspecies. Ternate Isl.
Fig. 5.—*O. b. mindanaensis* new subspecies. Davao, Mindanao, P. I.
Fig. 6.—*O. b. luzonensis* new subspecies. Manila, Philippine Isl.
Fig. 7.—*O. b. lacteoguttatus* Fairmaire. Dublon, Truk Isl., Caroline Islands.
Fig. 8.—*O. b. nipponensis* new subspecies. Ishigaki, Japan.
Fig. 9.—*O. b. taiwanus* new subspecies. Formosa.
Fig. 10.—*O. b. laosus* new subspecies. Laos.
Fig. 11.—*O. b. laosus* new subspecies. Singapore.

Fig. 12.—*O. b. tonkinus* new subspecies. Choganh, Tonkin.
Fig. 13.—*O. b. borneensis* Pic. Java.
Fig. 14.—*O. b. borneensis* Pic. Borneo.
Fig. 15.—*O. b. niasus* new subspecies. Kalimbungo, Central Nias.
Fig. 16.—*O. b. pseudoserratus* new subspecies. Waddawa, Ceylon.
Fig. 17.—*O. b. indianus* Thomson. 2 variants, Madras and Dehra Dun.
Fig. 18.—*O. b. indianus* Thomson. 2 variants, Seychelle Isl.
Fig. 19.—*O. b. quinquemaculatus* Breuning. British Bhutan, India.
Fig. 20.—*O. b. gressitti* new subspecies. Suifu, Szechwan, China.
Fig. 21.—*O. b. artemis* new subspecies. Andamans Isl.

PLATE XI

Olenecamptus

Fig. 1.—*O. cretaceus* Bates. Japan. × 2.5.
Fig. 2.—*O. marginatus marginatus* Schwarzer. Hori, Formosa. × 2.
Fig. 3.—*O. albidus albidus* Jordan. Luilu, Belgian Congo. × 3.6.
Fig. 4.—*O. albidus interruptus* Aurivillius. Lukuledi, Tanganyika. × 3.6.
Fig. 5.—*O. albidus leonensis* new subspecies. Sierra Leone. × 3.6.
Fig. 6.—*O. albidus natalensis* new subspecies. Natal. × 3.6.
Fig. 7.—*O. superbus* Pic. Yunnan, China. × 2.5.
Fig. 8.—*O. battangi* Villard. Mikindani, Tanganyika. × 3.2.
Fig. 9.—*O. octopustulatus octopustulatus* Motschulsky. Vladivostok, Siberia. × 4.
Fig. 10.—*O. octopustulatus decemmaculatus* Pic. Rivere Claire, Madon, Upper Tonkin. × 4.
Fig. 11.—*O. octopustulatus formosanus* Pic. Kuraru, Formosa. × 4.
Fig. 12.—*O. siamensis siamensis* Breuning. Siam. × 2.7.
Fig. 13.—*O. optatus optatus* Pascoe. Jering, Jambu, Siam. × 3.2.
Fig. 14.—*O. optatus optatoides* new subspecies. Sandakan, British North Borneo. × 2.7.
Fig. 15.—*O. quadriplagiatus* new species. Lao Kay, Tonkin. × 2.7.
Fig. 16.—*O. vittaticollis* Heller. Mt. Makiling, Luzon, Philippine Islands. × 2.7.
Fig. 17.—*O. affinis* Breuning. Sarawak, Borneo. × 3.
Fig. 18.—*O. fouqueti* Pic. Luang Prabang, French Indo-China. × 3.3.

PLATE XII

Olenecamptus

Fig. 1.—*O. triplagiatus triplagiatus* Jordan. Dimbokro, Ivory Coast. × 3.2.
Fig. 2.—*O. triplagiatus maculosus* new subspecies. Leverville, Belgian Congo. × 3.2.
Fig. 3.—*O. macari* Lameere. Uganda. × 3.
Fig. 4.—*O. hofmanni hofmanni* Quedenfeldt. Belgian Congo. × 2.7.

Fig. 5.—*O. hofmanni dimbokro* new subspecies. Dimbokro, Ivory Coast. × 2.7.
Fig. 6.—*O. hofmanni elegans* Aurivillius. Ruaha River, German East Africa. × 2.7.
Fig. 7.—*O. nubilis* Jordan. Kitwi, Uganda. × 3.3.
Fig. 8.—*O. somalius* new species. × 3.6.
Fig. 9.—*O. zanzibaricus* new species. Zanzibar. × 3.2.
Fig. 10.—*O. similis similis* new species. Namupa, German East Africa. × 4.5.
Fig. 11.—*O. similis congoensis* new subspecies. Luebo, Belgian Congo. × 4.5.
Fig. 12.—*O. australis* new species. Insuza River, Victoria Falls Road, Southern Rhodesia. × 3.6.
Fig. 13.—*O. olenus* Gahan. Sawmills, Southern Rhodesia. × 3.6.
Fig. 14.—*O. palawanus* new species. Palawan, Philippine Islands. × 5.7.
Fig. 15.—*O. senegalensis* Breuning. Senegal. × 3.1.
Fig. 16.—*O. indicus* Breuning. Sylhet, India. × 3.8.
Fig. 17.—*O. signaticollis signaticollis* Heller. Nilambur, Madras, India. × 3.
Fig. 18.—*O. giraffa* Breuning. Camara, India. × 3.6.

Plate XIII

Olenecamptus

Fig. 1.—*O. anogeissi* Gardner. India. × 3.5.
Fig. 2.—*O. basalis* Gahan. Darling, Christmas Island. × 2.9.
Fig. 3.—*O. serratus* Chevrolat. Pundaloya, Ceylon. × 3.
Fig. 4.—*O. detzneri* Kriesche. Bougainville Isl., Solomon Islands. × 4.
Fig. 5.—*O. griseipennis* Pic. North China. × 5.5.
Fig. 6.—*O. blairi* Breuning. Chota-Nagpore, Nowatoli, India. × 3.3.
Fig. 7.—*O. strigosus strigosus* Pascoe. Milne Bay, New Guinea. × 3.6.
Fig. 8.—*O. strigosus guadalcanalus* new subspecies. Guadalcanal Island. × 3.6.
Fig. 9.—*O. compressipes* Fairmaire. Siam. × 3.2.
Fig. 10.—*O. pseudostrigosus pseudostrigosus* Breuning. India. × 3.2.
Fig. 11.—*O. pseudostrigosus burmensis* new subspecies. Bhamo, Upper Burma. × 3.2.
Fig. 12.—*O. pseudostrigosus didius* new subspecies. Tonkin. × 3.2.
Fig. 13.—*O. dominus* Thomson. Cambodia, French Indo-China. × 3.2.
Fig. 14.—*O. albolineatus* Pic. Cochin China. × 3.5.
Fig. 15.—*O. multinotatus* Pic. Madras, India. × 3.
Fig. 16.—*O. malayensis* new species. Malay Peninsula. × 3.5.
Fig. 17.—*O. sandacanus* Heller. Sandacan, N. Borneo. × 3.2.
Fig. 18.—*O. sarawakensis* Breuning. Quop, W. Sarawak, Borneo. × 4.2.

PLATE XIV

Fig. 1.—*Olenecamptus clarus clarus* Pascoe. Chinkiang, China. × 4.5.
Fig. 2.—*O. clarus subobliteratus* Pic. Nanking, China. × 4.5.
Fig. 3.—*O. nigromaculatus* Pic. Tibet. × 3.5.
Fig. 4.—*O. patrizii* Aurivillius. Giuba, Italian Somaliland. × 4.5.
Fig. 5.—*Microlenecamptus obsoletus albatus* Matsushita. Kuraru, Formosa. × 5.5.
Fig. 6.—*M. obsoletus obsoletus* Fairmaire. Shanghai, China. × 5.5.
Fig. 7.—*M. biocellatus* Schwarzer. Kuraru, Formosa. × 4.5.
Fig. 8.—*Dorcaschema wildii* Uhler. Frankfort, Pennsylvania. × 3.
Fig. 9.—*D. alternatum alternatum* Say. Dauphin Co., Pennsylvania. × 4.
Fig. 10.—*D. alternatum octovittata* Knull. Davis Mts., Texas. × 4.
Fig. 11.—*D. nigrum* Say. Edgebrook, Illinois. × 5.
Fig. 12.—*Hetoemis cinerea cinerea* Olivier. Dauphin Co., Pennsylvania. × 5.
Fig. 13.—*H. cinerea bimaculata* new subspecies. Montgomery Co., Kansas. × 5.
Fig. 14.—*Olenecamptus tagalus tagalus* Heller. (After Heller.) × 3.
Fig. 15.—*O. tagalus zamboanga* new subspecies. Kabasalam, Zamboanga, Mindanao, P. I. × 4.
Fig. 16.—*Cylindrepomus cicindeloides* Schwarzer. Majayjay, Laguna, Luzon, P. I. × 2.5.

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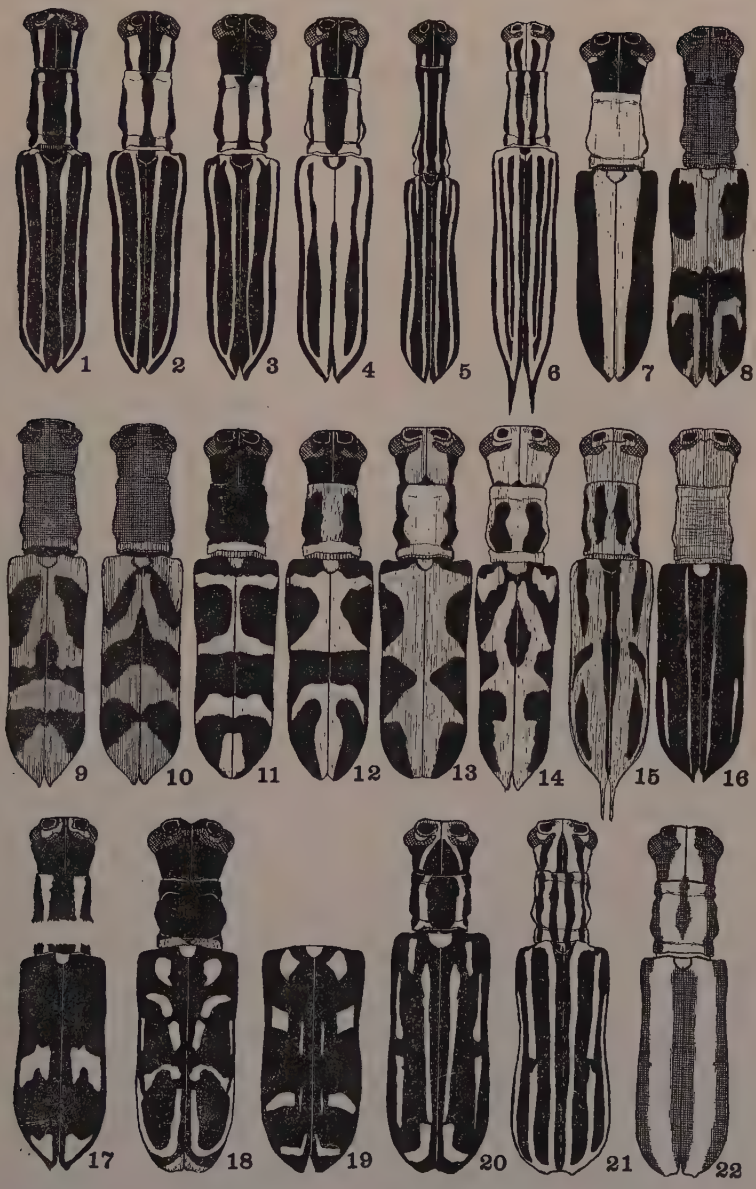
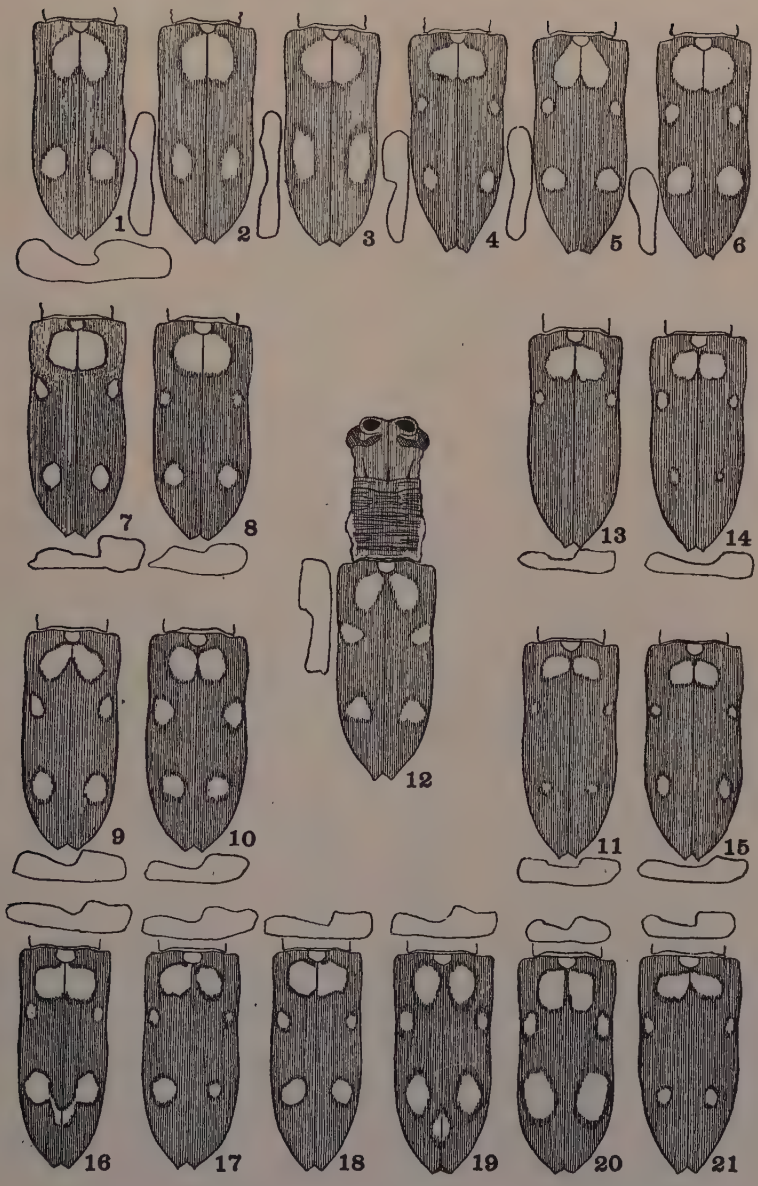


DILLON AND DILLON—THE TRIBE DORCASCHEMATINI



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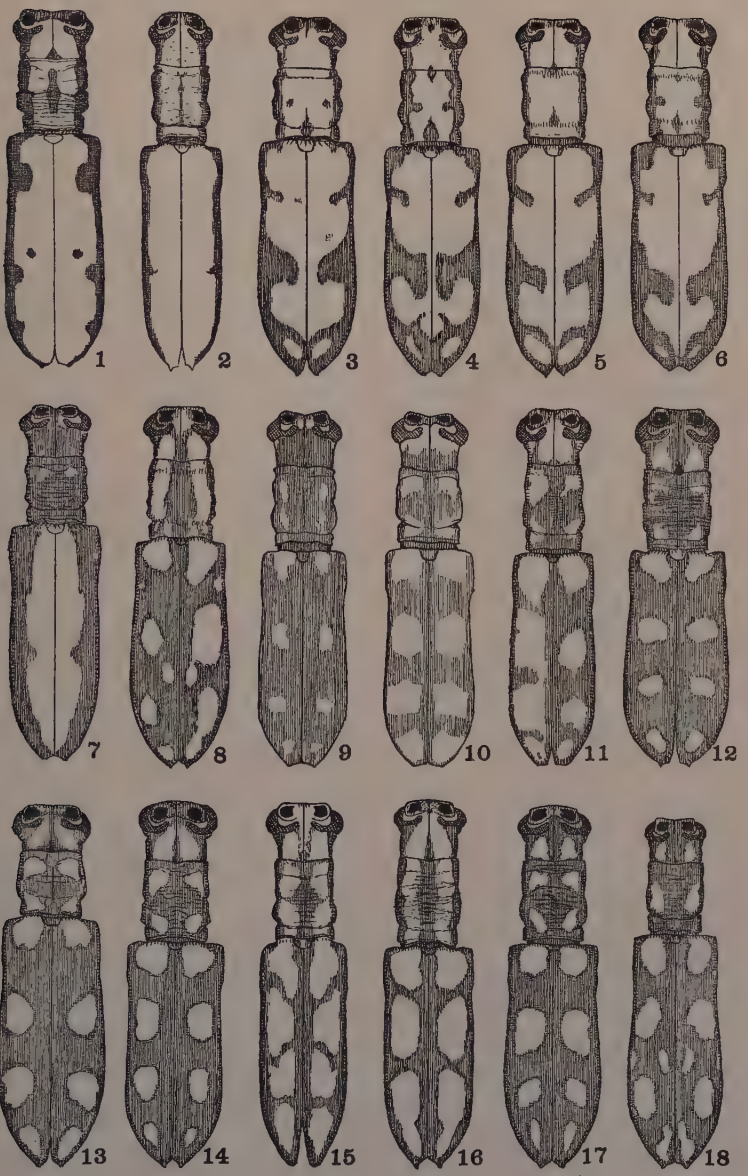
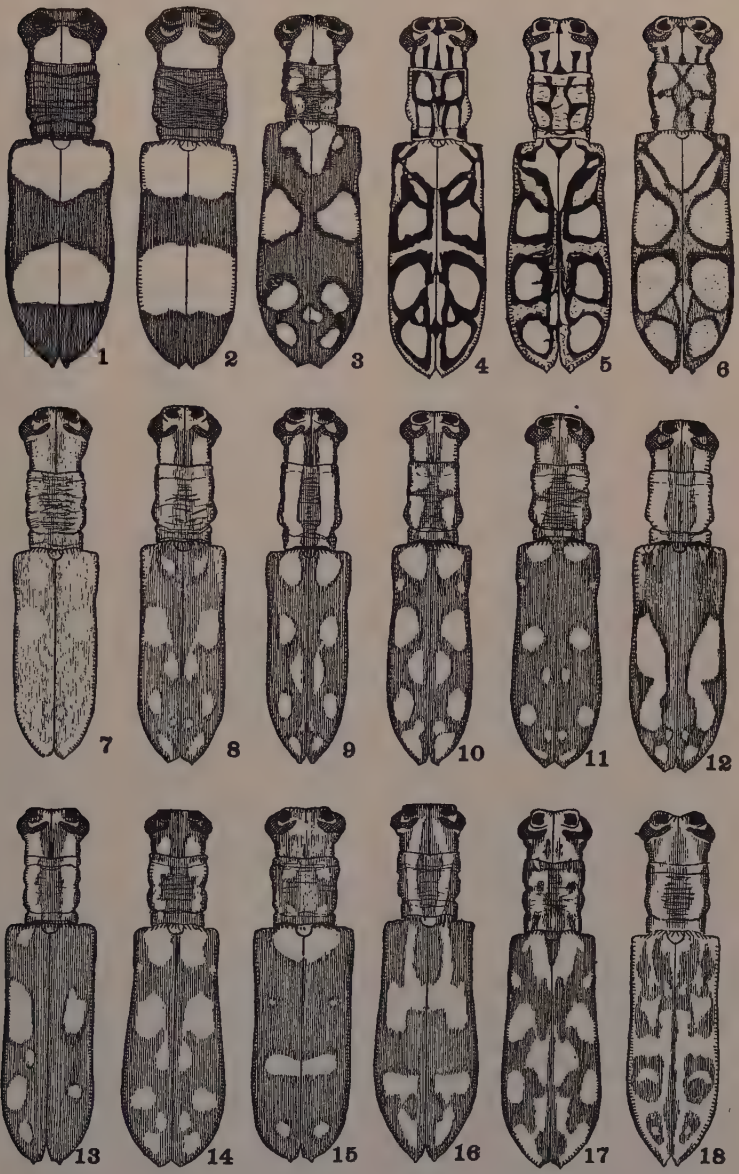
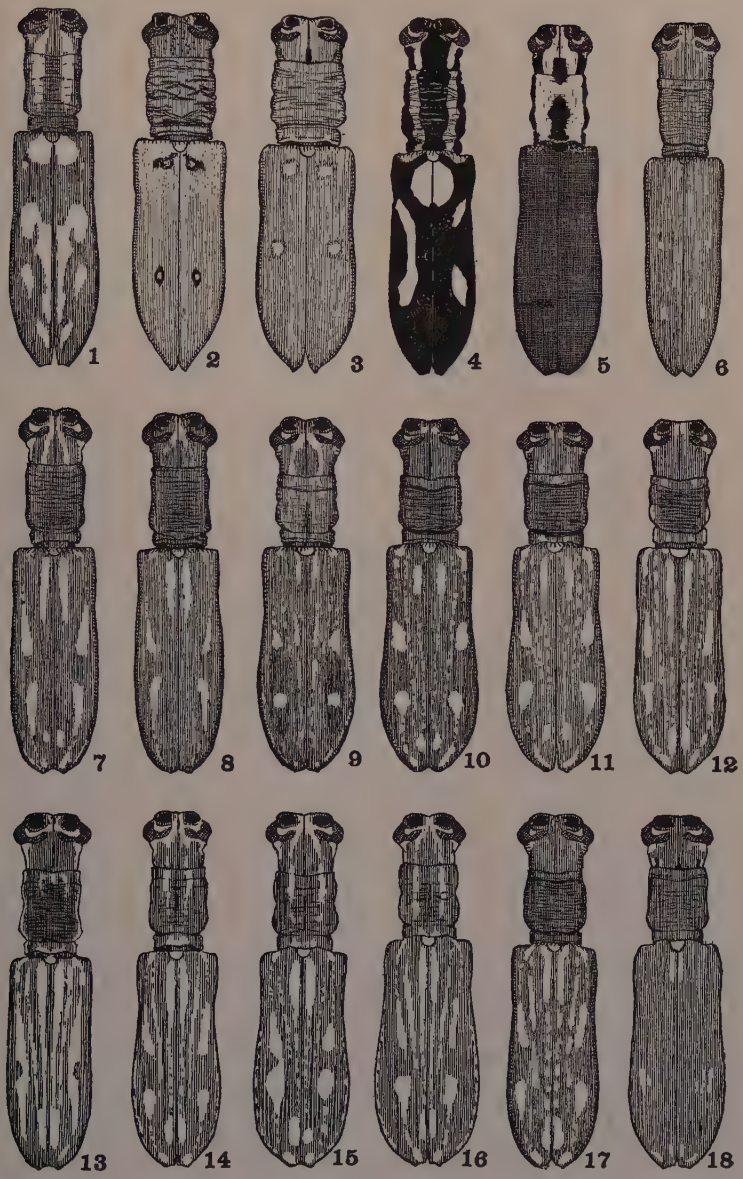


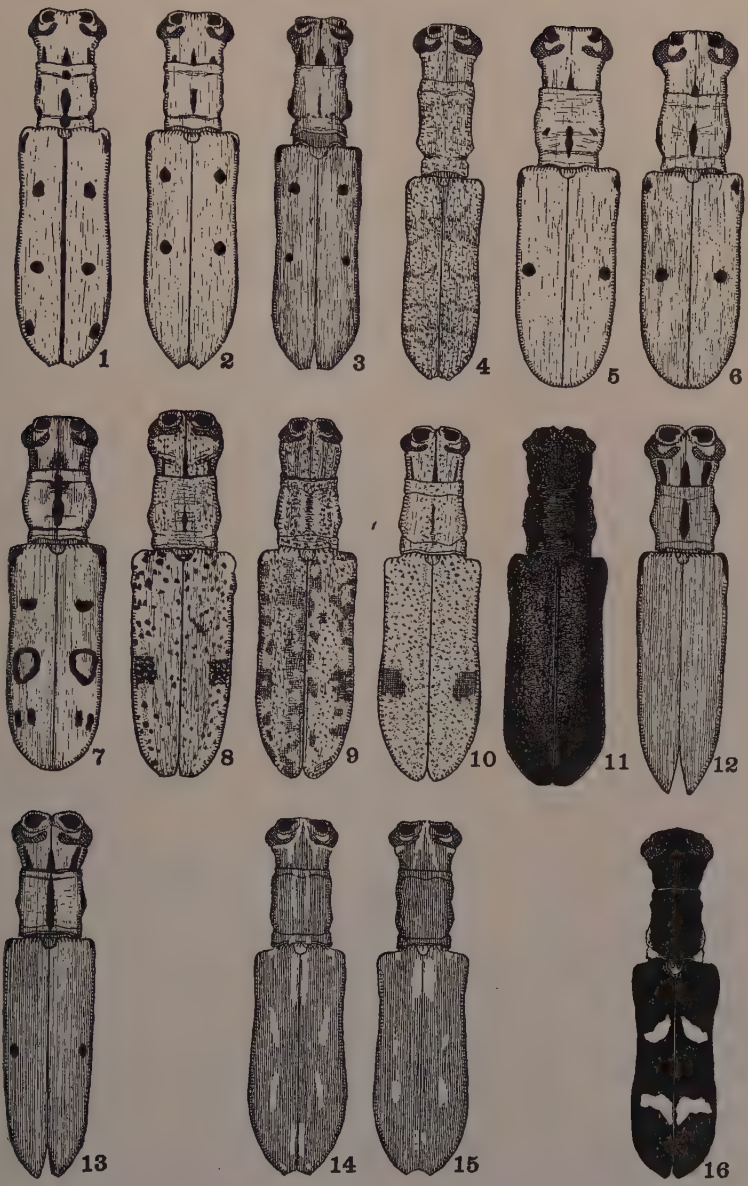
DILLON AND DILLON—THE TRIBE DORCASCHEMATINI



DILLON AND DILLON—THE TRIBE DORCASCHEMATINI



DILLON AND DILLON—THE TRIBE DORCASCHEMATINI



DILLON AND DILLON—THE TRIBE DORCASCHEMATINI

A REVIEW OF THE GENUS PHANAEUS INHABITING THE UNITED STATES

(SCARABAEIDAE: COLEOPTERA)

BY MARK ROBINSON

Springfield, Pennsylvania

The specimens used as the basis for this paper were about two hundred and fifty in number and are located in the collection of the Academy of Natural Sciences, Philadelphia or in the collection of the author, with the exception of a pair of *Phanaeus torrens niger* from the collection of O. L. Cartwright.

The last time the United States species of this genus were treated in a paper was by F. Blanchard,[1] with the exception of the fine monograph of the entire genus by d'Olsoufieff.[2] The present paper reduces two known forms to subspecific rank, two new subspecies are created and one species is added to the United States List.

Key to the Species and Subspecies

Clypeus at most feebly emarginate in front.....1
Clypeus deeply emarginate, with a tooth on either side of the emargination; black, semiopaque.....**pluto**
1. Elytral striae barely indicated.....2
Elytral striae deep or at least entirely visible without magnification.....3
2. Opaque; black with a greenish or bronze tint.....**triangularis**
Shining; bright blue or green.....**quadridens**
3. Elytral intervals coarsely, deeply and more or less confluently punctured.....4
Elytral intervals shallowly punctured, few of the punctures are confluent.....9

[1] 1885. F. Blanchard, Trans. Amer. Ent. Soc., XII, p. 168.
[2] 1924. G. d'Olsoufieff, Insecta Rennes, 13.

4. Intervals 1, 2, 3 and 4 costate.....6
   Intervals 1, costate, 2, 3 and 4 not costate.....7
6. Disk of thorax cupreous, elytra dark green.....**vindex vindex**
   Thorax bluish-green, elytra bluish-black.....**vindex cyanellus**
7. Hind angles of male thorax flared inwards; side margins in front irregularly serrate.....8
   Hind angles of male thorax flared outwards, side margins in front entire.....**vindex rubervirens**
8. Found in Texas to Kansas.....**difformis difformis**
   Found in Florida.....**difformis magnificens**
9. Elytral intervals with large, shallow punctures.....11
   Elytral intervals with fine, sharp punctures or obsoletely punctured.....10
10. ♂; thoracic discoidal elevation has the dentiform hind angles well separated; in front of these angles are a pair of tubercles, sometimes being connected by a transverse carina; between these tubercles and the anterior margin is another smaller tubercle.
    ♀; horn on head short bituberculate; posterior pronotal margin without fovaea.....**mexicanus**
    ♂; thoracic discoidal elevation has the cariniform hind angles more approximate; just behind the anterior margin are three well spaced tubercles.
    ♀; horn on head short trituberculate; posterior pronotal margin with a large punctiform impression on either side of the median line.
    amithaon
11. Color green or blue, the pronotum sometimes with a cupreous tint.....12
    Color coppery or black.....13
12. Elytral intervals coarsely, sometimes confluently punctured, the bottoms of the punctures granulose.....**igneus igneus**
    Elytral intervals coarsely punctured only near the margins, finely and sparsely punctured medially.....**igneus floridanus**
13. Color coppery.....**torrens torrens**
    Color black.....**torrens niger**

Phanaeus pluto Harold

1863. *Phanaeus pluto* Harold, Ann. Soc. Ent., Fr., p. 164.

This large black species has the head armed with a trituberculate carina in both sexes. The male has the projecting thoracic prominence quadrituberculate on the front edge while the female has a short, transverse, rounded ridge just back of the anterior edge of the pronotum; this ridge is followed by a slight depression.

Outside of Mexico this species has only been recorded from Arizona.

Phanaeus quadridens Say

1837. *Copris quadridens* Say, Bost. Journ. Nat. Hist., I, p. 176.

The well-developed male of this species is armed with a long, curved, acute horn on the head. The disk of the pronotum is triangularly shaped with the posterior angles produced into flattened, subacute projections; inside of each of these projections is a short, acute, conical tubercle. The anterior edge of the pronotal disk has a pair of sharp tubercles connected with a raised carina. The female has a short trituberculate horn on the head with a raised transverse line on the anterior part of the pronotum.

Like the preceding species this species has only been recorded from Arizona, outside of the Mexican localities.

Phanaeus vindex vindex MacLeay

1819. *Phanaeus vindex* MacLeay, Hor. Ent., I, p. 133.

This well-known species needs but little description. The fully developed male is armed somewhat like the preceding species except the four tubercles on the thoracic disk are missing; the posterior part of the thoracic disk has a raised, curved line connecting the inner side of the posterior projections. The female is armed as the preceding species except the frontal horn is rarely tuberculate.

This form is found all over eastern United States with the exception of the extreme northern sections.

Phanaeus vindex cyanellus Robinson

1938. *Phanaeus vindex cyanellus* Robinson, Trans. Amer. Ent. Soc., LXIV, p. 107.

This subspecies is found only in Florida.

Phanaeus vindex rubervirens new subspecies

In both sexes the elytral intervals are not costate as they are in the typical form; the basal half of the first interval has a wide flat costa in *rubervirens* while *vindex* has the first four intervals fully costate. In addition the color of the elytra is a yellowish green while *vindex* has the elytra a darker or bluish green. The elytral punctures in *rubervirens* are round, while they tend to be elongated in *vindex*.

The male genitalia of *rubervirens* differs from the typical form by having a wide deep groove parallel to and near the inside of each clasper, running back from the apex.

Length, 18 to 21 mm.; breadth, 10.5 to 12 mm.

Type.—♂; Chiricahua Mountains, Cochise County, Arizona, June 23, 1908. In the collection of the Academy of Natural Sciences, Philadelphia.

Allotype.—♀; Chiricahua Mountains, Cochise County, Arizona, August 6, 1908.

Paratypes.—3 ♂; with the same data as the allotype, 1 ♂; Carr Canyon, Huachuca Mountains, Cochise County, Arizona, 1 ♂; Palmerlee, Arizona, July 17 (H. A. Kaeber). 7 ♂, 10 ♀; Fort Huachuca, Arizona. 1 ♀; Estacion Conchos, Chihuahua, Mexico. Paratypes are deposited in the collection of the Academy of Natural Sciences and in the collection of the author.

Phanaeus difformis difformis Leconte

1847. *Phanaeus difformis* Leconte, Journ. Acad. Nat. Sci. Phila., (II), v. 1, p. 86.

The remarks under the subspecies *magnificens* plus the key should be sufficient to separate this fine species. The color varies from entirely green to specimens with the thorax green and the elytra blue to specimens with the disk of the thorax cupreous and the rest of the dorsal side green.

The range of this form extends from Kansas to Texas and New Mexico.

Phanaeus difformis magnificens new subspecies

This colorful insect can be distinguished from the typical form in the well-developed male specimen by the flat discal area on the pronotum being smaller and more confined, and the posterior ridge on this area is curved to meet the posterior angles while in *difformis* this ridge is more or less straight. The sculpturing of this discal area is sharper with evidently more space between the raised areas in *magnificens*. The sinuation before the hind angle appears to be more nearly at right angles in the new subspecies than in *difformis* in both sexes.

The major difference in the females of these two forms is in the transverse ridge on the pronotum which in *difformis* is curved while it is straight in the new form. The pronotal sculpturing on the disk is sharper and a little more widely separated in this sex, the same as in the male.

The male genitalia of *magnificens* have the claspers straight in outline when viewed dorsally while *difformis* has these claspers turned inwards at the tip when viewed in the same direction.

The color of the head and pronotum is green with purplish reflections, the flat area on the pronotum of the male is cupreous while the male horn is black. The elytra of both sexes are purplish with the sutural area of the male green.

Length, 20 mm.; breadth, 11.5 mm.

Type.—♂; Romeo, Marion County, Florida, April 15, 1947, (M. Robinson). In the collection of the author.

Allotype.—♀; with the same data as the type. In the collection of the author.

Phanaeus triangularis Say

1823. *Phanaeus triangularis* Say, Journ. Acad. Nat. Sci. Phila., (I), v. III, p. 206.

The head and thorax of this opaque species is of the same general shape as *vindex* in both sexes but the sculpturing of the surface is finer. The elytral surface is granulose with irregular, wavy, raised areas; the striae are barely indicated.

Described from Arkansas but also has been collected in Missouri, Texas and South Carolina.

Phanaeus torrens torrens Leconte

1847. *Phanaeus torrens* Leconte, Journ. Acad. Nat. Sci. Phila., (II), I, p. 85.

1854. *Phanaeus triangularis torrens* Leconte, Proc. Acad. Nat. Sci. Phila., VII, p. 217.

This form was reduced to varietal rank by Leconte in 1854, when he wrote, "by the completion of the series of specimens, proves to be a bright colored, short horned variety of *P. triangularis.*"

This author has never seen specimens intermediate between *torrens* and *triangularis;* all specimens examined have been easily placed with one or the other species and for this reason he has placed *torrens* as a distinct species.

Phanaeus torrens is shining, not opaque; the elytral striae strongly impressed and the intervals convex, not flat as they are in *triangularis.* In addition the male genitalia are shorter and not granulate at the tips of the claspers as in *triangularis.* I have not seen any male specimens with a long horn on the head, all seen, including the type, having a short, acute horn.

Specimens have been examined that were collected in Kentucky and Kansas.

Phanaeus torrens niger d'Olsoufieff

1924. *Phanaeus niger* d'Olsoufieff, Insecta Rennes, 13, p. 95.

This form was described from specimens collected in Louisiana and specimens have been examined from that state, Mississippi

and Mexico, agreeing very well with the written description. An examination of the male genitalia of these specimens shows a marked variance from the illustration in d'Olsoufieff's paper; the tips of the claspers are not raised into short knobs as illustrated in his paper. This leads me to conclude that the illustration is in error as the written description fits the insect in all characters.

This insect agrees with typical *torrens* in all respects except color, being black as the name implies, while *torrens* is coppery; the male genitalia of the two species seem to be identical.

Phanaeus igneus igneus MacLeay

1819. *Phanaeus igneus* MacLeay, Hor. Ent., I, p. 133.

This form has been collected from North Carolina to northern Florida.

Phanaeus igneus floridanus d'Olsoufieff

1924. *Phanaeus floridanus* d'Olsoufieff, Insecta Rennes, 13, p. 94.

This subspecies was described as a full species but an examination of a large series of specimens reveals it to be a southern form of *igneus,* it being found only in Florida. This subspecies differs from the typical form in being more shining, and in having the elytral intervals with the surface less densely punctured. All forms of intergradation occur in northern Florida. The male genitalia of most of the specimens examined seem to be intermediate between the illustrations in d'Olsoufieff's paper for *igneus* and *floridanus.*

Phanaeus mexicanus Harold

1863. *Phanaeus mexicanus* Harold, Ann. Soc. Ent. Fr. (4), III, p. 171.

The information given in the key should be sufficient to distinguish this species from the following species and any others known to occur in the United States. Has been collected in Arizona.

Phanaeus amithaon Harold

1875. *Phanaeus amithaon* Harold, Col. Hefte, XIII, p. 88.

This species is added to the United States lists on the strength of four specimens collected at Phoenix, Arizona on the 10th of

August, 1908. These specimens are located in the collections of the author and the Academy of Natural Sciences of Philadelphia.

The types of this species were collected at Guanajuato, Mexico, but I have seen samples from Nayarit and Sinaloa. This indicates that the species occurs from the type locality westward to the west coast of Mexico then northward to Arizona.

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STUDIES ON THE NORTH AMERICAN SPECIES OF THE GENUS GOMPHUS

(ODONATA)

BY JAMES G. NEEDHAM

Cornell University

(Plate XV and text-figure)

This is an attempt to interpret relationships among the fifty North American species of the difficult genus *Gomphus*. In the broader sense intended in this title, this genus includes more than half of our species belonging in the Family Gomphidae: more than are in the other ten genera taken together. The species range throughout the north temperate zones of the world, but the center of their abundance is eastern North America.

When Baron de Selys in 1854 began the publication of his *Synopsis des Gomphines* he had only a dozen species of *Gomphus* from North America. One of these, *fraternus*, had been described by Thomas Say in 1839; four, *dilatatus, notatus, pallidus* and *minutus,* by Rambur in 1842; the other seven he described as new. The twelve showed so great diversity that he arranged them (together with half a dozen Old World species) in seven groups, only one of which contained species from outside the North American continent.

Two fine large species, easily distinguished by the huge spines on the hind femora, he set apart in the "Subgenus *Dromogomphus.*" For each of the other six groups he designated a type, listing with it related species, as follows:

DILATATUS, this species only.

VULGATISSIMUS, *fraternus* and seven Old World species.

PALLIDUS, *villosipes, lividus, spicatus, minutus* and *exilis.*

PARVULUS, this species only.

PLAGIATUS, this species only.

NOTATUS, this species only.

The genus had its first comprehensive treatment and careful exposition in Selys' *Monographie des Gomphines* in 1858. This work was based on comparative study and illustrated with excellent drawings of genitalia by Dr. Hermann A. Hagen, who as collaborator furnished manuscript descriptions of five new North American species, also wrote much of the account of the finer morphological details for genera and higher groups and made all the illustrations. And it may here be remarked parenthetically, that these drawings were among the earliest to emphasize the great importance of the detailed study of genitalia as an aid to species recognition.

In the *Monographie* and in the four additions to his *Synopsis,* Selys added descriptions of the following new species:

In the *dilatatus* group he placed *externus, crassus, vastus* and *ventricosus.* In the *vulgatissimus* group he placed *adelphus, confraternus, graslinellus, kurilis* and *quadricolor.* In the *pallidus* group he placed *furcifer* and *intricatus.* In the *parvulus* group he placed *abbreviatus, albistylus* and *brevis.* In the *plagiatus* group he placed *amnicola, olivaceus, scudderi* (after first associating this species with *Drogomphus*) and *spiniceps.*

The first separate listing of American species was made by Dr. Hagen in 1861 in his *Synopsis of the Neuroptera of North America.* He described nineteen species under the genus *Gomphus* (including three of them in *Dromogomphus*). Five of them had been first described in Selys' *Monographie* and illustrated in plates 9 and 21 of that work. In the *Synopsis* Hagen did not fully recognize the groupings of Selys but he arranged the species somewhat in the Selysian order.

In 1885 Hagen published his *Monograph of the Earlier Stages of the Odonata* (Trans. Amer. Ent. Soc., XII: 249–291) in which he described the nymphs of fifteen species of *Gomphus.* Again he refrained from allocating the species to the groups that Selys had proposed, and for reasons stated or implied in the following quotation from that paper (p. 260):

"This group is still somewhat polymorphous, as *G. vulgatissimus* has been considered the type, with *G. adelphus?, fraternus?, exilis, minutus?, furcifer?,* and perhaps *amnicola?,* and *graslinellus?*. . . . I have avoided any further division, as of the fifteen species de-

scribed only four are raised, and as of the other ones, only for a few of them can a somewhat risked supposition be made." And on page 253: "The question of accepting a higher rank than that of subgenus for some of the groups now proposed, can only be decided after a sufficient knowledge of the nymphae of the other subgenera accepted for known imagos."

It so chanced, however, that the four reared species that Hagen had before him were the type species of four of the Selysian groups: *vulgatissimus, plagiatus, pallidus* and *notatus* groups. He described the nymphs in detail, and then pointed out more concisely what he considered group characters, as hereinafter will be noted.

Among the nymphs in Hagen's hands that were not reared he had the type of another Selysian group, *Gomphus parvulus,* but he didn't know it. In fact he made a very bad guess as to its identity when he called it *"Uropetala* [*Tachopteryx*] *thoreyi,* supposition"! This species I reared in 1900 and established for it, and the closely allied *G. albistylus,* the genus *Lanthus.*

The two genera *Dromogomphus* and *Lanthus* have since been generally recognized, without any questions as to what species should be included in them. Another, the Notatus Group of his first list, ceased from troubling when de Selys himself decided that it should be merged with *plagiatus.* It is with the composition of the four remaining Selysian groups of species (II, III, IV and VI) that this paper is chiefly concerned.

Kellicott (1899) placed the Ohio species in these groups as Selys had left them excepting *externus* which he placed in the Vulgatissimus Group. Williamson (1900) did the same with the Indiana species, adding *descriptus* to that Group. Since that time there have been five attempts at a better definition of these groups; and this present paper is a sixth one, the results of which appear in the last column of the accompanying table, page 313.

In the first column of this table are the names of the fifty valid species that seem to belong here, in alphabetic order, and with the name of the describer and date of description of each. The second column shows my own arrangement of them in 1901. The third and fourth columns show the arrangement by Williamson and Muttkowski respectively. These two columns appeared side by side in Muttkowski's Catalog of 1910. The fifth column shows

Garman's arrangement of them in his Odonata of Connecticut (1927). The sixth is that of Needham and Heywood's *Handbook of the Odonata of North America* in 1929; and the last column is my own present and still tentative arrangement of them.

Williamson had been carefully studying Gomphine venation long before he furnished that list to Muttkowski for publication in 1910. Indeed he had published in two useful papers on *Gomphus* his own original groupings of the species. The first of these papers was in his second addition to the list of Indiana dragonflies, published in 1901 (p. 122), but completed much earlier. In this list he made three groups of the twenty-two American species that he then knew.

The other Williamson list was in an appendix to his *Stylurus* paper of 1901. It bore the subtitle "The Postanal Cells of the Genus Gomphus." It gave the results of a careful comparative study and tabulation of the cells of the first postanal interspace (*x*). He used for that study 822 specimens of 26 North American and 3 European species. He presented the results in condensed form in a list of the species used and in a key to the groupings of these species. List and key were accompanied by thirteen small figures of the types of cell arrangement. The list gave the names of the species, the numbers of specimens of each used, and the numbers showing each type of crossvein and cell arrangement. The key sorted the species into unnamed groups, made no reference to the Selysian groupings, but foreshadowed the arrangement shown in column 2 of the table herewith.

In this second list of Williamson's, there was a first group of the more typical species (the nearest allies of *G. vulgatissimus*) with nine North American species in it. These he said were distinguishable by their having vein "A2" [= A1] straight and by having normally two complete rows of postanal cells filling the first anal interspace (*x*), while all the others have that vein angulated near its base, and the vertical cell rows less complete.

His second group of three species was the equivalent of *Arigomphus* and of Selys' Group IV, and it included the type species of that group, *G. pallidus*.

His third group of ten species was compounded of species that have since found place in *Stylurus* and *Gomphurus*. The second

and third groups were to be distinguished by the number of full-width postanal cells normally filling the base of the first anal interspace: one full-width cell, in the second group; two, in the third group.

All this was appended to a discussion of *Lanthus,* which genus he recognized.

Williamson had large numbers of specimens of only a few species; wholly inadequate numbers of the others, and of course, the greatest variation was found in the species of which he had the largest numbers of specimens. In all this painstaking study of postanal cells and their dividings he found no characters that were constant; but he found in the basal angulation of vein A1 a character of which he could say "not variable."

Both these Williamson papers used small figures for illustrating the venational characters. Unfortunately for the convenience of the reader, the drawings were made with the wings turned to the right in the first paper and to the left in the second. All are small and do not include the more familiar landmarks of the wing, such as the triangle, but only the first anal interspace; all of which makes comparing the figures difficult.

Still more unfortunately, veins A1 and A2 are transposed in the labelling. The numbering of both veins and interspaces in the conventional way, around the wing margin from front to rear, makes comparisons easier. The well established zoological tradition of showing the left side of an animal in drawing it, would be followed by drawing wings with their tips to the right; for the under side of the wing is morphologically its left side. The first position taken by the wings of an emerging imago is the erect one.

Studies on Immature Stages

The need of more knowledge of the immature stages was first made evident by the beautiful drawings of Cabot's paper of 1872. Three of the species shown in his plates, *vulgatissimus, pallidus* and *spiniceps,* were types of Selys' groups III, IV and VI, respectively. They showed that differences among the nymphs are quite as great as among the adults; and being quite another category of differences, they confirmed the later proposed segregation into lesser

groups. Hagen's ample descriptions of 1885 further confirmed these groupings, but with scanty added usable material.

I began my own work on Odonata by collecting and rearing nymphs, and the first one that I reared happened to be a *Gomphus*. When in 1897 I had reared additional species belonging to all of Selys' groups and had found them paralleling the adults, and in the main confirming the proposed alliances, I applied names to the groups as follows:

Lanthus, to the Parvulus Group, as hereinbefore noted; *Arigomphus,* to the Pallidus Group; *Stylurus,* to the Plagiatus Group; and I said in that paper of 1897 (p. 166) that the Dilatatus Group "may yet be set apart."

In my Adirondack bulletin of 1901, after further rearings of additional species, I gave fuller characterization of the four groups that are here under consideration, and applied the name *Gomphurus* to the Dilatatus Group.

These divisions of the genus *Gomphus s. lat.* were based on concurrent differences and likenesses in the adult and nymphal stages. I think that to consider either alone is to ignore half of the evidence. It now appears to me that two of my proposed subgenera, *Arigomphus* and *Stylurus,* are worthy of full generic rank, and that *Gomphurus* also is at least a good subgenus. With these three removed, the genus *Gomphus s. lat.* is still polymorphic, and in need of further analysis.

Of the fifty species named in the first column of the table which follows, the first one to be made known was described by Thomas Say in 1839. Rambur followed in 1842 with descriptions of four more. Hagen and de Selys in their time each added nine, and Walsh in 1862 and 1863, six more. These were the pioneers. Since their day twenty-one species have been added: six described by myself, four by Williamson, two each by Muttkowski and Mrs. Gloyd, and one each by the following seven persons: Banks, Calvert, Currie, Hine, Pritchard, Tough and Walker. I present here a table of these species, listing them in the first column in alphabetic order for convenience of reference. By following the lines across the page one may see where each species has been placed by those authors who have undertaken the taxonomic task that Selys initiated by his set of numerals.

In order to account for other names that have been proposed for American species of the genus *Gomphus,* I incorporate here a list of synonyms, prepared by Mr. Minter J. Westfall, Jr., who has assisted me also in other ways in this study.

Synonyms of American Species of Gomphus

abditus Butler = *amnicola* Walsh; *teste* Williamson 1932.
alleni Howe = *quadricolor* Walsh; *teste* Westfall 1945.
argus Needham = *descriptus* Banks; *teste* Westfall 1945.
consobrinus Walsh = *externus* Selys; *teste* Selys 1878.
donneri Kennedy = *burilis* Hagen; *teste* Gloyd 1941.
elongatus Selys = *plagiatus* Selys; *teste* Selys 1878.
fluvialis Walsh = *notatus* Rambur; *teste* Selys 1878.
jucundus Needham = *notatus* Rambur; *teste* Westfall 1945.
mortimer Needham = *descriptus* Banks; *teste* Westfall 1945.
nevadensis Kennedy = *olivaceus* Selys; *teste* N. and H. Handbook 1929.
pilipes Hagen = *pallidus* Rambur; *teste* Selys 1878.
rogersi Gloyd = *consanguis* Selys; *teste* Klots 1944.
segregans Needham = *spiniceps* Walsh; *teste* Williamson 1901.
subapicalis Williamson = *lentulus* Needham; *teste* Gloyd 1941.
sobrinus Selys = *confraternus* Selys; *teste* N. and H. Handbook 1929.
sordidus Hagen = *lividus* Selys; *teste* Hagen 1875.
umbratus Needham = *lividus* Selys; *teste* Williamson 1900.
walshii Kellicott = *crassus* Selys; *teste* Williamson 1900.
whedoni Muttkowski = *cornutus* Tough; new herewith.

North American Gomphus

Species	Ndm. 1901	Wmsn. 1910	Mtk. 1910	Garm. 1927	N. & H. 1929	Hereiu
abbreviatus Hagen 1878	III[1]	III	III	*[2]	II	III
adelphus Selys 1857	III	?III	?III		II	II
amnicola Walsh 1862	II	VI	VI	VII	II	VI
australis Ndm. 1897	IV				III	III
borealis Ndm. 1900	III	III	III	?IV	III	III
brevis Hagen 1878	III	III	III	*	II	III
brimleyi Muttk. 1911					III	III
cavillaris Ndm. 1902		III	III		III	III
confraternus Selys 1873					II	III

[1] The Roman numerals in the table represent Selys' groups of species:
II, the DILATATUS group: *Gomphurus.*
III, the VULGATISSIMUS group: *Gomphus* in the stricter sense.
IV, the PALLIDUS group: *Arigomphus.*
VI, the PLAGIATUS group: *Stylurus.*

[2] * = Garman's new Group 1.

Species	Ndm. 1901	Wmsn. 1910	Mtk. 1910	Garm. 1927	N. & H. 1929	Herein
consanguis Selys 1879					II	II
cornutus Tough 1900		?III	?IV		IV	IV
crassus Hagen 1878		II	III	II	II	II
descriptus Banks 1896	III	III	III	III	III	III
dilatatus Ramb. 1842	II	II	II	?II	II	II
exilis Selys 1854	III	III	III	III	III	III
externus Hagen 1857		II	III	II	II	II
falcatus Gloyd 1944						VI
flavocaudatus Walker 1941						III
fraternus Say 1839	III	II	III	II	II	II
furcifer Hagen 1878	IV	III	?IV	IV	IV	IV
graslinellus Walsh 1862		III	III	II	III	III
hybridus Wmsn. 1902		II	III		II	II
intricatus Hagen 1857		III	III		VI	VI
ivae Wmsn. 1932						VI
kurilis Hagen 1857					II	III
laurae Wmsn. 1932						VI
lentulus Ndm. 1902					IV	IV
lineatifrons Calv. 1921				?II	II	II
lividus Selys 1854	III	III	III	III	III	III
militaris Hagen 1857		?III			III	III
minutus Ramb. 1842		?III			III	III
modestus Ndm. 1942						II
notatus Ramb. 1842		VI	VI	VI	VI	VI
oklahomensis Pritch. 1935						III
olivaceus Selys 1873		VI			VI	VI
pallidus Ramb. 1842		?IV		IV	IV	IV
parvidens Currie 1917					II	III
plagiatus Selys 1854	VI	VI	VI	VI	VI	VI
potulentus Ndm. 1942						VI
quadricolor Walsh 1862	III	III	III	?II	III	III
scudderi Selys 1873	II	VI	VI	VI	II	VI
spicatus Hagen 1854	IV	III	III	III	III	III

Species	Ndm. 1901	Wmsn. 1910	Mtk. 1910	Garm. 1927	N. & H. 1929	Herein
spiniceps Walsh 1862	VI	VI	VI	VI	VI	VI
submedianus Wmsn. 1914					IV	IV
townesi Gloyd 1936						VI
vastus Walsh 1862	II	II	II	II	II	II
ventricosus Walsh 1863	II	II	II	II	II	II
villosipes Selys 1854	IV	IV	IV	IV	IV	IV
viridifrons Hine 1901		III	III		II	III
williamsoni Muttk. 1910		III	III		III	III

The Present Placement of Species

Gomphurus	*Gomphus*	*Stylurus*
1 adelphus	1 abbreviatus	1 amnicola
2 consanguis	2 australis	2 falcatus
3 crassus	3 borealis	3 intricatus
4 *dilatatus* [3]	4 brevis	4 ivae
5 externus	5 brimleyi	5 laurae
6 fraternus	6 cavillaris	6 notatus
7 hybridus	7 confraternus	7 olivaceus
8 lineatifrons	8 descriptus	8 *plagiatus*
9 modestus	9 exilis	9 potulentus
10 vastus	10 flavocaudatus	10 scudderi
11 ventricosus	11 graslinellus	11 spiniceps
	12 kurilis	12 townesi
	13 lividus	
	14 militaris	*Arigomphus*
	15 minutus	1 cornutus
	16 oklahomensis	2 furcifer
	17 parvidens	3 lentulus
	18 quadricolor	4 *pallidus*
	19 spicatus	5 submedianus
	20 viridifrons	6 villosipes
	21 williamsoni	

The table shows great diversity of opinion. Eight of the species have been too recently described to appear in any of the five hitherto published lists. Only nine of the other forty-two species appear in the same group in the first five of these lists, and two of

[3] Italics indicate the type species in the three segregates from *Gomphus*.

those nine are type species of their respective groups and could not well be placed elsewhere.

The Present Study

In the following pages I now record the results of some recent studies of my own on materials for Gomphine taxonomy from three sources, long familiar: wing venation and accessory genitalia of adults, and form and structures of nymphs. I have studied these in the hope of finding more and better clues to relationships within the group. I will first present a summary of the characters common to them all, and follow that summary with a review of the special features in each of the several groups of species that appear in the preceding table.

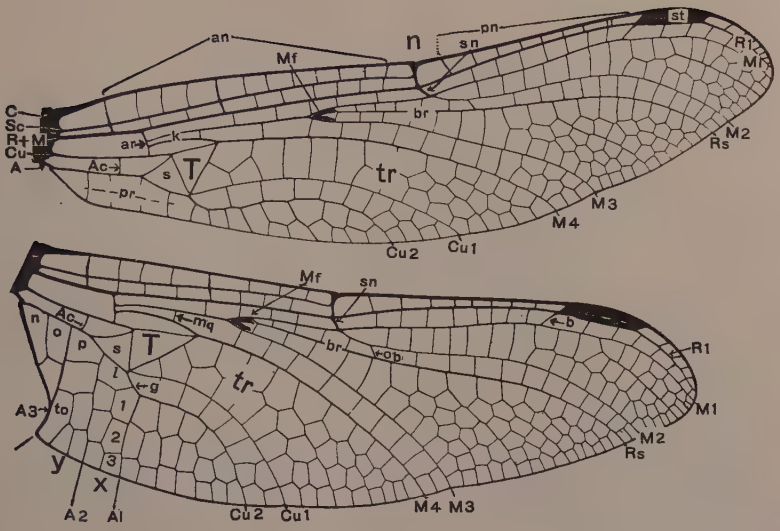
Venation

In wing venation this entire Complex of species appears on first glance to be singularly uniform. The following characters are common throughout: first and fifth antenodals thickened; no basal subcostal crossvein; no crossveins in either triangle, super- or subtriangle; two cell rows in the trigonal interspace; stigma with a brace vein; anal loop undeveloped, or one of a single cell only; anal triangle of the male in the hind wing three-celled; middle fork (*Mf*) symmetrical; and the intermedian crossveins, 2–3/1 in fore and hind wing respectively. These are normal; deviations from them are exceptional.[4]

In view of the confusion that has been introduced in the terminology of Odonate wing venation, I deem it desirable to accompany the following discussion with a labelled figure giving precise meaning to the terms used in it. The terms are not new.

The six principal veins, common to insects generally, bear the usual designations: Costa (*C*), Subcosta (*Sc*), Radius (*R*), Media (*M*), Cubitus (*Cu*), and Anal (*A*), at base and at tips. The Subcosta ends at the nodus (*n*). Branches of principal veins are numbered from front to rear around the wing margin. Veins R and M are fused for a distance at the base into a compound vein.

[4] In attempting further analysis of the *Gomphus* Complex I have been greatly aided by studies on Gomphine venation that were made by Elsie Broughton Klots under my direction some years ago, and that are as yet unpublished. Insofar as her studies relate to the genus *Gomphus* I have been kindly allowed to make use of her manuscript. It was her work that revealed to me the surprising constancy of the first three paranal cells in the hind wing.



Wings of *Gomphus cavillaris*, photo by M. J. Westfall, Jr.; not retouched, merely labelled. See detailed explanation in the text.

That fusion is indicated by the plus (+) sign at their common base. Vein M breaks away to rearward to form the upper part of the arculus (*ar*), and to divide there into two up-arching branches, the well-known *sectors of the arculus* (*k*).

A second fusion of veins R and M occurs behind the nodus where vein R gives off a single branch to rearward, the radial sector (Rs). The subnodus (*sn*) is the base of this branch, and the oblique vein (*ob*), its continuation. Between these two short connectives there is complete fusion of Rs with M2. From the outer end of the oblique vein, where Rs turns sharply toward the wing tip, a secondarily developed bridge (*br*) runs backward to find support in the Middle fork (*Mf*) of vein M.

This bridge looks like the true base of Rs but is not. Its origin and crossing of M are revealed by the study of its development. Veins were first formed about tracheae, and in the Odonata, are so formed still in the main. Adult veins, of course, cannot cross in such manner, but the tracheae around which they develop can.[5]

[5] Tracheal origins are discussed and illustrated somewhat at length in my papers of 1903 and 1935.

Vein M forks as it descends the arculus to meet a short cross vein that connects it with vein Cu. The further branching of its upper sector (*M 1 + 3*) at *Mf* and at *sn* is obvious. M4 continues unbranched to the wing margin. (The fork *Mf* is black-bordered in our figure to make it easily recognized.)

The true course of the Cubital vein (*Cu*) is not obvious at first glance. It runs straight out past the arculus. Then it bends out of course to form the inner-side of the triangle **T**. The triangle is a central feature in the tie-up of long veins into a strong supporting frame work for the wing. Vein Cu then forks at the hind angle of the triangle and its two up-arching branches turn outward to the distant wing margin. The other sides of the triangle are made out of two overgrown crossveins that meet at their outer ends where they attach to vein M4. The crossvein that forms the front side of the triangle is turned so far out of its original position that it looks like a continuation of the vein Cu itself, and it has been so misinterpreted.

The Anal vein (*A*) is similarly bent out of course at the subtriangle (*s*), which is formed in the same way by the outward slanting of the crossvein that forms its front side—only that in its case the bend and the slant are less pronounced. Two branches (A2 and A3) are given off by the Anal vein on its way out from the base to its meeting with the vein Cu at the hind angle of the triangle. At that junction occurs another fusion: veins Cu2 and A1 unite for a short distance to form the gaff (*g*), another compound vein. At the end of the gaff vein A1 runs to rearward more or less parallel with A2 and A3.

Fore and hind wings differ most in the part that remains to be considered, the Anal Area. This part is narrow and nearly featureless in the fore wing, but in the hind it is expanded to provide the wing with its broadest gliding surface.

The whole Anal Area is divided by veins A2 and A3 into three interspaces. These veins are easily recognizable in *Gomphus*. For conciseness the interspaces are labelled *x*, *y* and *z* in the figure (and often so mentioned in the text). In males of *Gomphus* the third anal interspace (*z*) is made over into another kind of triangle: a basal triangle that borders the excavated inner margin of the wing but does not quite reach the rather prominent hind-

angle. At that corner the vein A3 forms a part of the border. Area *y* develops there a thickened marginal vein, and alongside it, a vertically elongated cell that is generally several times higher than adjacent marginal cells. This strongly bordered and relatively constant cell (*to*) may be called the *tornal cell,* or simply the *tornus.*[6] In females the hind wing is more broadly rounded at the base and the cells are smaller, less differentiated and more numerous.

The five paranal cells of this fore wing are collectively labelled *pr* in our figure.

The last paranal cell (*l*) adjoins another line of cells that runs nearly perpendicular to the line of the paranals. The latter cells border vein A1 to the wing margin on its proximal side. These are the *postanal* cells of Williamson (1901) and they are labelled in our figure 1, 2 and 3. Postanals, though less dependable than the paranals, are sufficiently constant in numbers to be of some value in the recognition of genera and species.

The single cubito-anal crossvein before the triangle, in both wings labelled *Ac,* is the anal crossing.

Ante- and postnodal crossveins (and areas) are labelled *an* and *pn* respectively. The crossveins above the bridge (*br*) are indicated by the term "bridge crossveins." Intermedian crossveins are those found within the first fork of the vein M between the arculus and the middle fork (*Mf*). There are two of them in the fore wing and one in the hind labelled (*mq*) of our figure (*q* being the standard abbreviation for crossvein set by Dr. Ris in his great work on the Libellulinae of the Selys Collection: *q* stands for "Querader"; crossvein). Another crossvein common to both wings is the strong one supporting the thick stigma (*st*), labelled *b,* and called the brace vein of the stigma.

The trigonal interspace (*tr*) is of importance because of the varied shape and content of rows of cells in regular rows: "cell rows beyond the triangle"; "discal cell-rows," etc. The rows are counted where they first fall into regular lines of three or more cells.

[6] Thus borrowing a name from the Lepidopterists, the name by which they designate the angle between the inner and the outer margins of the hind wing in moths.

Genitalia

The caudal appendages of the male, being large and fully exposed to view, have been carefully studied and adequately illustrated, and I have nothing to add concerning them. The copulatory apparatus of the second abdominal segment has received less attention, though its availability as an aid to recognition of species has been generally recognized since the publication of Hagen's twenty-two plates of figures in Selys' *Monographie des Gomphines* in 1858. I now wish to add a few notes and illustrations of these lesser parts.

As is well known, a genital pocket (see Plate XV) lies in the sternum of the second abdominal segment. A penis springs from the front end of the sternum of the third segment and extends forward, folded double upon itself when at rest, on the middle of the pocket floor. The front half of the sternum of the second abdominal segment develops as an anterior lamina that completes the rim of the pocket in front. A rigid semicylindric upcurving guard (the *"cuillere"* of Hagen: the spoon; see fig. B of plate) rises from the middle line of the pocket floor; it covers and protects the U-bend of the penis much as the guard of a bicycle wheel protects the rear of the tire. Converging over the rounded tip of the guard are two pairs of hamules that arise from the side walls of the pocket. The tip of the guard is quite uniform in the genus *Gomphus,* but the hamules and the penis differ greatly according to species.

The two pairs of hamules stand next the side walls of the pocket. They surround the guard and reach up and curve inward to protect the penis on the upper side. (In these descriptions the genital pocket is supposed to be inverted for examination. Above means on top as seen in that position; it does not mean dorsal.) Their tips are variously armed with hooks for attachment to the female in copulation. The anterior hamules are smaller than the posteriors, and stand closer together partially in front of the guard. Both pairs are more or less concave on the inner side. Fringes of hair that project from their margins to rearward, complete the inclosure in which the folded penis lies sequestered.

The anterior hamules, though small, are in *Gomphus* excellent indicators of relationships among the species. They differ sig-

nificantly in form and in slant, but it is the hooks or teeth at their tips that mainly give them character. Diverse as they are it may be convenient to consider them as of three principal types. Most prevalent is a stubby type; short; hardly reaching above the level of the tip of the guard; with inflexed teeth at the tip that may only be seen by looking down on them from above, and then with difficulty, especially if black in color. For lack of a better name, and because this hamule looks somewhat like the hand with closed fingers when viewed from the back, I have called this the "thumb-and-knuckles" type. The thumb is represented by a larger tooth that usually stands apart on the front border; the knuckles, by the bases of the other teeth as seen when looking across them. The type species of *Gomphus, G. vulgatissimus* of Europe, has an anterior hamule that is distinctly of this type. The Brevis Group of four species has a hamule of this type. So also has the larger *Gomphurus* group, and scattering other species of *Gomphus s. str.* The front edge of the body of this hamule in some species tends to be inrolled giving it internally a channeled form, and towards the rear margin of the channel on the inner side there stands a thin line or patch of bristles with tips directed to rearward.

Probably more primitive, at least less complicated, is the ascending type of anterior hamule that characterizes the species of *Arigomphus.* This hamule is larger, widens upward to the level of the top of the guard; then is abruptly rounded to a single inturned claw at the distal end.

Another type, as yet known from but two species, *descriptus* and *quadricolor,* has this end hook drawn out on a long stalk that superficially resembles an anatomist's tenaculum.

The anterior hamule appears in its simplest (and probably, degenerate) form in *Stylurus;* a short and narrow blade, without either hook or tooth, toppled over backward, and in extreme cases almost entirely hidden between the enlarged posterior hamules.

The posterior hamules are very much larger than the anteriors in *Gomphus;* both wider and higher. Their high point is the single end hook that is more or less continuous with the hind margin into which that edge runs. The body of this hamule widens upward to a point somewhere on its front edge, midway up or higher, where there is generally a prominent angle. That

angle is often capped with a hump, or short spines or other sort of contact roughnesses. The portion of the hamule above the angle I may be permitted to call the neck. It tapers more or less abruptly upward into the end hook. The neck varies much in length. In the type species, *G. vulgatissimus,* the hamule is nearly neckless. Its end hook rises but little above the level of the spine-covered angle at the shoulder.

In *Stylurus* the posterior hamule is a simple, flattened, parallel-edged blade that slants or curves forward edgewise more or less, and is suddenly narrowed at the top to a single claw-like end hook.

The penis in *Gomphus* is remarkably variable at both ends. The very large muscle-filled basal segment, that was called the "vesicle" when it was thought to be a sperm receptacle, I now call the peduncle. The fourth segment at the tip is very small and only in part chitinized. The two intervening segments are without special features.[7]

When the penis, folded upon itself, nestles down in its guard under the convergent tips of the hamules, its ends meet. The small 4th segment slips endwise into a cleft in the front of the big peduncle.

The peduncle is broadly attached by a spreading base to the front end of the half membranous sternum of the 3d abdominal segment. It rocks back and forth on a crossbar-like thickening in the membrane at the front. Above its base it rises in a mound-like swelling that I will call the hood (it is hood shaped in some species and opens forward). Singularly little use has been made of this hood in past studies notwithstanding that it is the easiest part to see, and being rigidly chitinized, is of very definite form.

The many forms of hood may perhaps be disposed in two groups that I shall call for purposes of description the *split-loaf* type and the *cleft-pyramidal* type, both these terms being suggested by the form as seen in side view. The split-loaf is an elongated hood, rounded over all from end to end. The more or less pyramidal form results from a narrowing of the hood from the base upward and a straightening and stiffening of its back. The median longi-

[7] The spur that occurs at the apex of the second segment in some other genera of Gomphines is present in at least one subdivision of the old Selysian genus *Gomphus:* the Oriental genus *Xenogomphus:* type, the Chinese species, *Gomphus agricola.*

tudinal cleft in the hood may penetrate to or even through the back, making the summit, when viewed from the rear, bilobed. When the cleft deepens, its widened edges are sometimes lined with stiff black hair; and if their margins then become thickened, as oftenest happens in *Arigomphus,* the U-shaped hairy rim, seen from the front, takes on the aspect of a fur collar. The dimensions of the cleft are correlated with the size and shape of the 4th penis segment and its tails.

That 4th segment is, in *Gomphus,* a small affair. From a chitinized tapering basal ring, slung in the membrane at the tip of the third segment, it narrows abruptly to a short tapering tube that bears one or two transparent, lash-like, tapering tails at its tip. There are numerous features that might be noted here regarding the relation of parts to the openings that serve for filling and emptying the sperm receptacle; I will mention but one: one that is easily seen: the length of the tails.

The tails are longest in *Arigomphus.* The body of the 4th segment in that genus merges insensibly into the tail. Elsewhere body and tail are more sharply delimited. The tail is short and tip-tilted from the apex of the body of the segment in *Stylurus.* Elsewhere in *Gomphus* there is more variety.

Characteristics of the Several Groups

I will now briefly review the generic subdivisions, beginning where taking hold is easiest, with a group that stands well apart from all the others in both nymphal and adult characters.

Arigomphus

This name was proposed by me for Selys' Pallidus Group (Group IV) in 1897 (Can. Ent., xxix: 167 and 181). The genus runs to paleness; to dull greens and grays and browns and it almost lacks yellows. The dark stripes of the thorax are reduced in width or wanting. The face is green or pale olivaceous, without dark cross stripes. The costal vein is edged with yellow.

The 7th, 8th, 9th and 10th abdominal segments progressively diminish in length; the 10th is longer than half the 9th. The apical end of the 9th is obliquely truncated, longer on the dorsal side.

Venation.—The triangles of the wing are rather large, and that of the hind wing tends to have a sagging outer side. Crossveins are considerably reduced, especially toward the wing base, where the intervals between them are rather wide. In the fore wing the front side of the triangle is a tenth, and in the hind wing a fifth longer than the inner side. The gaff is more than half as long as the inner side of the triangle. The paranals in the fore wing are five or six with very few marginals behind them or with no marginals at all; in the hind wing the paranals are generally five; when but four, the last one is elongated in the axis of the wing, and it may simulate an anal loop. The male anal triangle is long, extending well toward the hind margin of the wing, and Vein A3 runs straight out to the margin, is not recurved as in the other genera, and forms a less prominent angle at the tornus. The postanal cells are four or five. The first anal interspace (*x*) is generally wider than the second (*y*). The males of *Arigomphus* are further distinguished by the hairiness of the hind femora.

Genitalia.—The tips of the superior caudal appendages of the male are angulated, or tend to become forked with the long arm of the fork on the inner side, and the sharp tips of the pair convergent. There are no teeth on them. The outer arm or angle is short and blunt, or even reduced to a black tubercle. The fork of the inferior appendage is wide, its tips extending laterally farther than the tips of the superiors (except in *furcifer*).

The appendages of the genital pocket.—These are distinctive. The anterior hamule of the male is rather stout, simple, more or less dilated above the middle and contracted at the end to a single, strong, claw-like, inturned hook. The posterior hamule is large and strongly aslant to rearward. On the front edge of it, beyond the level of the tip of the anterior hamule, is a low unarmed shoulder that is strongly angulated in *furcifer,* less so in *cornutus,* low and scarcely angulate in the other species. Beyond the shoulder this hamule declines and tapers into a long, inturned, goose-neck-like hook, the recurved end of which is obliquely truncated and chisel-edged on the inner side.

The peduncle of the penis is cleft-pyramidal in lateral view, deeply divided in front and a little way along its crest, and very hairy within the edges of the cleft. Those edges may be more or less thickened or outrolled like a collar, even presenting in lateral view a backwardly projecting rim. The fourth joint of the penis is of unusual length. It tapers very gradually outward from its thick base into two rather stout lash-like tails of very variable length. The tails are longest in *submedianus* and *villosipes.* In *furcifer* only, the tails are short, and sharply delimited at their base from the body of the 4th segment by a notch and an angulation.

The subgenital plate of the female is generally about half as long as the sternum of the 9th segment and deeply bilobed at its tip.

Nymphal characters.—Cabot's fine figure of *Gomphus pilipes* [= *pallidus.* 1872, Pl. 1, Fig. 3] shows well the form of the nymph. Hagen's description of it (1885, p. 266) is followed (p.

267) by a summary of its principal characters, that will still serve fairly well for a characterization of the nymphs of the genus. I quote:

"The principal characters for *G. pallidus* are the middle tooth in the front margin of the mask, which becomes blackish in the full grown; the teeth along the whole inner margin of the palpus; the sloping of the abdomen is continuous and not suddenly stronger after the 7th segment; the middle dorsal spine on apical margin of the 9th; the lateral spines only on 7 to 9, the latter one longer."

The middle tooth on the median lobe of the labium is not distinctive and may be sometimes lacking; likewise the minute "middle dorsal spine on the apical margin of the 9th" abdominal segment; but the acuminate form, the taper of the abdomen, and the shape and placement of the "teeth along the whole inner margin of the palpus" are in combination quite peculiar to *Arigomphus*. The lateral spine of the 9th segment, besides being very much longer than those of the other segments, is different in form. It is laterally flattened and closely appressed to the sides of segment 10. The skin of the body is markedly puberulent over the dorsal surface.

The nymph of *furcifer* stands apart from the other species in that it has developed something of an end hook on the lateral lobe of the labium, and has the front border of the middle lobe less rounded and without median tooth.

Some likeness to *Gomphurus* is seen in *furcifer* in the form of its posterior hamule; especially its high angular shoulder and the less pronounced and shorter goose-neck bend beyond; also in the fourth segment of the penis, which has a longer body and shorter tails than in other species of *Arigomphus,* with a distinct notch between body and tails.

The most primitive member of the genus is probably *furcifer*. The characters by which it differs from the others as stated above are those by which it is approximated to members of other groups.

Stylurus

This group is less homogeneous than *Arigomphus*. There is much better development of color pattern, with brighter yellows and greens in the ground and deeper browns and blacks in the sutural stripes. The abdomen is very variable in proportions; its end segments are of various lengths and breadths; the 10th is generally about half as long as the 9th; the end of the 9th is cut off

squarely. The female generally has a pair of minute pale horns on the top of the head.

Venation.—The triangles of the wings are much as in *Arigomphus;* that of the hind wing a little shorter and its outer side less sagging. The intermedian crossveins are 2/1, sometimes 3/1, rarely (*scudderi*) 4/1, in fore and hind wings respectively. The paranal cells of the fore wing are five to seven, generally six, with from one to four marginal cells alongside. In the hind wing the paranal cells are generally four, the last one being a fairly well-defined anal loop. Vein A1 is angulated at one-cell-distance beyond the gaff, and the first anal interspace (*x*) is generally narrower than the second (*y*). The hind wing has four or five postanal cells.

Genitalia.—The superior caudal appendages of the male are rather simple. They lack forks or distinct teeth, but they may bear low ridges near their upwardly beveled tips. They point more or less directly to rearward. The arms of the fork of the inferior appendage have about the same lateral spread as the superiors.

The anterior hamule is small and simple; a thin, flattened, more or less linear, unarmed plate, that is often hidden between the strongly developed posteriors. The latter are almost equally simple but they are large and prominent, and end in a sharp inturned tooth. They stand erect (or very slightly inclined backward in *scudderi*), or are strongly inclined forward in several species. They are strongly *bent* forward edgewise, in a full-length curve in *olivaceus.*

The small fourth segment of the penis also is distinctive. It is very short, hardly longer than the third segment is wide; and its tip-tilted tail is only about as long as its body.

The subgenital plate of the female is very short, hardly ever reaching a fourth the length of the 9th sternite, and it is rather widely and deeply notched at the tip.

In the rather close consistency of the above genital characters lies the justification for including *amnicola* and *scudderi* in the genus *Stylurus;* for in most other characters they more closely resemble species of *Gomphurus* with which they have most often been associated hitherto.

Nymphal characters.—The form of the nymph is very decidedly elongate and more or less depressed, with wide-sprawling front and middle legs, that have scant development of tibial burrowing hooks. The form of the abdomen I illustrated (1897, Pl. 29, fig. 15) in contrast with that of *pallidus.* The median lobe of the labium is straight edged or only slightly produced in a low convex curve. The lateral lobes are produced in a long and strong sharply incurved end hook, with only a few (two to four) large blade-like teeth on the inner margin. There is a middorsal groove on the depressed middle segments of the abdomen as far back as the 7th or 8th; there are lateral spines on 6 to 9, and there is a vestige of a middorsal hook on 9.

Nymph.—Dr. H. A. Hagen wrote the first good descriptions of nymphs of this genus and he first characterized them as a group (1885, p. 269). I quote:

"*G. plagiatus, notatus, spiniceps, olivaceus?* form a type rather different of all other *Gomphus* by the long spindle-shaped abdomen, not broader than the head, the length of segment 9 and the rudimentary hooks of the anterior tibiae. . . . The very abnormal form of the abdomen indicates, perhaps, a higher group than a sub-genus."

It was these species that Selys set apart as a Plagiatus Group. It was for these that I proposed the name *Stylurus* in 1897. Critical study of the male genitalia has led to the enlargement of the boundaries of the group so as to include other species. The distinctive characters for the more inclusive *Stylurus* are found in the genital hamules of the male.

The twelve species of this genus fall readily into two groups: a *plagiatus-notatus group* which includes also *falcatus, potulentus, olivaceus* and *spiniceps,* and less homogeneous *intricatus group* which includes *ivae, laurae, amnicola, townesi* and *scudderi.* The two last named are the more aberrant members.

Somewhat apart from all the other species stands *intricatus,* by reason of its reduced venation and short triangles. The front side of the fore wing triangle is only about as long as the inner side. Also it has a longer gaff than any of the other species, a longer tornal cell, and a longer 10th abdominal segment; and there is scarcely any angulation of its vein A1.

Clearly there are two widely divergent trends in form of body in the genus thus expanded: one, toward a long and narrow abdomen, reaches its culmination in *spiniceps;* the other, toward a broadly clubbed abdomen, in *scudderi.*

Gomphurus

This group parallels *Stylurus* in many ways, and with that group some of its species may easily be confused. In form of body the species of *Gomphurus* are shorter and stockier, with a more heavily clubbed abdomen, as the generic name indicates. There is a great range in depth of coloration, but all the species have well-developed thoracic stripes of brown or black.

Venation.—The triangles of the wing are somewhat smaller than in *Stylurus,* and somewhat more nearly equal in size in fore and hind wing.

In the fore wing the front side of the triangle is about the same length as the inner side; in the hind wing it is about a fifth longer; in both wings the straight outer side is about a fifth longer than the front side. The second thickened antenodal crossvein is generally number five, but sometimes it is number four, most often in the hind wing. The paranal cells are generally six in the fore wing with one to four marginals added on the wing border. In the hind wing, the gaff is half as long as the inner side of the triangle or a little more. There are generally four postanal cells. Vein A1 is more or less angulated at one-cell-length distance below the gaff. The second anal interspace (*y*) generally starts with two full-width cells: the first one of which is the third paranal, and one other. Interspace *x* is generally narrower than *y*.

Genitalia.—The superior caudal appendages of the male are stout at the base and quickly narrowed and arched thereafter, variously carinate, and toothed more or less before the acute tip. The inferior appendage is widely forked, the tips of the fork lying generally outside the superiors. The appendages of the second segment are prominent. The anterior hamules are short and sometimes concealed. Though very diverse, they may be considered as of the "thumb and knuckles" type. The posterior hamule is broad and prominent. There is always something of a shoulder on its front margin; often a prominent angle that may be spinulose or bluntly toothed. This shoulder is lowest in *ventricosus*. The neck is shortest and most strongly crooked in *hybridus*. The fourth segment of the penis has the shortest tails in *dilatatus;* the longest in *externus*.

The subgenital plate of the female (not known for *consanguis*) is generally more than half as long as the sternum of the 9th segment, and always bifid at the tip.

Nymphal characters.—These are the broadest and flattest nymphs of the *Gomphus* Complex. The abdomen is greatly depressed and abruptly narrowed at the hind end. There are minute dorsal hooks on abdominal segments 7 or 8 and 9, preceded by a middorsal groove on the middle segments. There are lateral spines on 6 to 9. The thin and flaring sides of the 9th segment are spinulose-serrate. The labium is rather short and wide. Its middle lobe is generally somewhat convex on the front margin. The lateral lobes have something of an end hook, with from five to nine small teeth before the hook on the inner margin. The superior and inferior caudal appendages are of equal length; the laterals, a little shorter.

The best characters for distinguishing *Gomphurus* are to be found in the genitalia; especially in the form of the anterior hamule in the male, and in the much greater length of the subgenital plate in the female. Its tip reaches to or beyond the middle of the sternum of 9. The nymphs are recognizable by their more depressed form of body, the spinulose-serrate margin of the broader 9th abdominal segment, and the more numerous little teeth on the lateral lobe of the labium.

As in *Stylurus,* so in *Gomphurus,* there are within the genus two minor groups of more closely associated species, and two strays that seem to stand a little apart from both (the strays being the little known species *adelphus* and *consanguis*). In the Dilatatus Group fall *lineatifrons, modestus, vastus,* and *ventricosus.* In the Fraternus Group fall *crassus, externus,* and *hybridus.* The two groups differ in form of body, in certain minor features of both venation and genitalia and in depth of pigmentation in the coloration of the body. So marked is the difference in color that one might playfully refer to the groups as brunettes and blonds, respectively. The Dilatatus Group I regard as the more specialized, having more open network in venation, more broadly clubbed abdomen, deeper pigmentation and less similarity to other groups of the great *Gomphus* Complex. These were first adequately treated by Calvert in 1921 (*Trans. Amer. Ent. Soc.,* XLVII: 221–232, 2 pls.).

These darker species were the only ones I had in mind when in 1897 (page 166) I wrote concerning Selys' Group II:

"The dilatatus group [is] characterized by extreme dilatation of the abdomen in the imago, and correspondingly greater width of the 9th abdominal segment in the nymph." I trust that this quotation makes it obvious that I meant to accept Selys' designation of the type species for this group; and I continue with that same intent.

GOMPHUS s. str.

The remaining American species of the *Gomphus* Complex are a mixed lot. They are Gomphines of medium or smaller size. The abdomen is moderately clubbed, especially in the males. The occiput is pale in all, and the costal edge of the wing is yellow.

Venation.—The front side of the triangle of the fore wing is generally about equal in length to the inner side; in the hind wing, longer. The paranal cells of the fore wing are five, six or seven, with accompanying marginals none to seven. The paranals of the hind wing are five, two of which (or sometimes one wide cell) fill the base of the first anal interspace (*x*). The 1st anal vein runs direct to the hind margin of the wing, and is without angulation below the gaff. The gaff varies in length between four tenths and nine tenths the length of the inner side of the triangle.

Genitalia.—The superior appendages of the male are strongly divergent

at base, develop more or less of a projecting angle midway of the outer side, beyond which they straighten out and extend their acute tips to rearward more or less directly between the widely outspread tips of the inferior appendage. On the outer angle, and on the inner margin as well, there may be a low downwardly directed tooth.

In the genitalia of the 2nd segment the form of the anterior hamule is extremely varied; most commonly it is of the "thumb-and-knuckles" type that prevails more uniformly in *Gomphurus*. As in that genus, the "knuckles" may differ with the species in number, size and incurvature. The "thumb" portion may dwindle, or it may lengthen until it becomes a hook that is visible from the side as in *lividus;* the hook may be bifid at its tip, as in *confraternus* and *kurilis;* or three toothed and resembling a foot with claws, as in *spicatus* and *militaris;* or it may remain single, and when the "knuckles" disappear, may become a hook on so long a stalk that it resembles an anatomist's tenaculum, as in *descriptus* and *quadricolor*. The "knuckles" may form a single uniform row of inflexed denticles, as in *vulgatissimus,* and *borealis,* or may be differentiated as in *exilis* and *cavillaris*. Sometimes the "thumb" disappears and one of the "knuckles" attains prominence, as in *graslinellus* and *oklahomensis;* or the "thumb" alone may survive, while remaining inflexed and not visible from the side, as in *minutus*.

The posterior hamule also varies greatly. The shoulder is set high on the anterior margin in the nearly neckless *vulgatissimus;* also, in *graslinellus* and *oklahomensis,* and in all four species of the Brevis Group. The shoulder is generally lower, with something of a neck tapering upward into the end hook. The contour of the shoulder as seen from the side is rounded, swollen and beset with chitinous prickles in *vulgatissimus;* broader but smooth in *parvidens;* high and sharply angulate in *brevis,* blunt and set low, with a long neck stretching beyond it in *australis,* and *cavillaris*. A shoulder is practically wanting (at least in lateral view) in *descriptus, borealis* and in *confraternus,* in which species the hamule approaches in outline the form of a seated penguin, front forward, the end hook representing the penguin's beak: this form may be more or less dimly discerned also in *kurilis, lividus, militaris, quadricolor* and *spicatus*. Lacking a name for this form of posterior hamule and in order to save space, I will call it the *penguinoid type*.

The subgenital plate of the female is bifid, or at least bilobed, and short, ranging from a tenth or less the length of the 9th sternite in *lividus* to a third of it in *descriptus* and *spicatus*.

In the penis all types of hood are present, varying from the nearly hemispherical hood of *militaris,* to the tall, square-topped cleft-pyramidal one of *descriptus*. At the distal end of the penis all lengths of tails are found, from the mere vestige of *australis,* to the long lashes of *descriptus* and *borealis*.

Nymphal characteristics.—The first review of nymphs of the *Gomphus* Complex was that of Hagen, made in 1885, to which reference has already twice been made in these pages. In an introductory section of that paper he arranged the nymphs in four groups (page 252), two of which are the

equivalents of *Stylurus* and *Arigomphus* as herein interpreted. The other two groups dealt with the species that we are now considering, and he separated them as follows; I quote:

"Another group is represented by *G. vulgatissimus*. . . . The flat lancet-shaped abdomen has the dorsal segments, 3 to 8 or less, divided by a sharply impressed middle line into two halves."

"The last group . . . has the dorsal segments not divided, but with strong dorsal hooks; the abdomen is less flat and mostly narrower. To this group belong *G. vastus* and *G. exilis*."

In this last-quoted line Hagen confused his categories, perhaps by inadvertently writing one name while thinking another; for *vastus* has the middorsal impressed line, and no hooks, on the middle segments, and is of the wide form of body: *G. exilis* exactly fits his "last group" definition, but *vastus* certainly does not. I have several reared specimens of *G. vastus,* including both sexes. I have re-examined them carefully, and compared them with Hagen's detailed description of the nymph of *vastus* (p. 265) and they are all in close agreement. Singularly enough, in Hagen's description he makes no mention of either hooks or groove on the middle abdominal segments; but the other correlated characters stated are quite sufficient to prove that it belongs to the group having the middorsal groove, and prevents placing it with *exilis*.

There is one little group of four small, stocky, blackish species that stand well apart from the others and call for special mention: *brevis, abbreviatus, parvidens* and *viridifrons*. These four show certain likenesses in genitalia and in form of nymph to *vulgatissimus* but not in wing venation. There is no angulation of vein A1 below the gaff; veins A1 and A2 are widely separated at their origin, with generally two complete rows of cells between them to the wing margin. The gaff is as long as the inner side of the triangle, or generally a little longer. The nymphs so far as known (*brevis* and *abbreviatus* only) are hardly distinguishable from those of *Gomphurus* except by their smaller size.

This little group of species has been set apart by a first rubric in keys several times (Williamson, 1901, p. 215; Needham, 1901, p. 445; Garman, 1927, p. 141; Needham and Heywood, 1929, p. 86). Garman designated it as his "Group I" (*l.c.*, p. 149). In 1901, because of likeness in nymphal characters, I placed it in *Gomphurus* before I had discovered the venational differences.

In *brevis* there are certain obvious likenesses to *vulgatissimus*. These are seen in the short thick caudal appendages of the male and in the converging ridges on the long subgenital plate of the female. But on closer inspection these characters are not distinctive. The superior appendages of the male are much more stubby; the inferiors are much less widely forking; the 10th segment is shorter and wider; the subgenital plate of the female is not widely notched at the tip. Moreover *brevis* is much stockier in stature. Its head is much flatter, lacking the high occipital crest of *vulgatissimus; viridifrons* comes nearer in this respect, but is less like *vulgatissimus* in form of posterior hamule. In the venation of the Anal Area of the wing there are differences in both sexes. Veins A1 and A2 are much more sinuate in *vulgatissimus*. In the male the anal triangle is larger in relative area and often 5-celled in *vulgatissimus;* and beyond its apex, vein A3 is more strongly curved, and the tornus is much more prominent than in *brevis*. In the female of *brevis* there are only about half as many cells in the 3d anal interspace (*z*) as in *vulgatissimus*.

With *vulgatissimus* and these four members of the *Brevis* Group for the moment set aside, the remaining species all have nymphs of the kind defined in Hagen's fourth and last group. I may be permitted to speak of them as an *Exilis* Group, since that is the only species he named in the group that agreed with his definition. The nymphs have no middorsal groove on the back of the abdomen, but have a row of low dorsal hooks in the place of it. They also have smaller teeth on the inner margin of the lateral labial lobes. They have lateral spines on abdominal segments 6 to 9, with those on the 8th and 9th segments about equally well developed. The abdomen is simply lanceolate to rearward, much less blunt than in *Gomphurus* and *Stylurus* and less acuminate than in *Arigomphus*.

There are two species however that approach *Arigomphus* in several respects: *australis* and *cavillaris*. The nymphs of these two have long slender bodies that taper to rearward as in *Arigomphus,* and lack lateral spines on segments 6 and 7. Also the adult male has the posterior hamule long and sway-backed; however with much less of a graceful smooth goose-neck-like curve; in other characters there is less likeness. The likeness is probably

a mere parallelism; for *australis* stands well apart in other characters; notably, by its extremely long 9th abdominal segment, that is a fourth longer than the 8th in the male (female unknown). The relative lengths of the last four segments are about as 7:8:10:4. Intermediate in some respects is the nymph of *spicatus* which lacks a lateral spine on the sixth abdominal segment only —a fact that once misled me to place *spicatus* erroneously in *Arigomphus* (1901, p. 448).

Incidentally, *australis* is the only member of the Exilis Group that has the face cross-striped with brown; in the others it is all yellow or at least pale in color.

Somewhat unique among the allies of *exilis* by reason of its scanty venation is the small southern species *cavillaris*. This species (possibly, the little known *brimleyi* as well) has the cells in the trigonal interspace reduced to a single row for a distance of from two to six cells. It has but one or two crossveins under the stigma; antenodal crossveins in the hind wing only seven or eight; two or three bridge crossveins; four postanal cells, and correspondingly sparse venation throughout.

Two other species, *borealis* and *descriptus,* stand somewhat apart by reason of their having a more abundant venation: mostly six or seven bridge crossveins; five to seven crossveins under the stigma; six or seven postanal cells; intermedian crossveins often 3/1 in fore and hind wing respectively. In both nymphal and adult stages the two species are of similar aspect. In the genitalia of the second segment they agree in some particulars and differ strongly in others. The fourth segment of the penis has very long tails in both, the longest of any in the Exilis Group; but the basal segment (peduncle) is very different; split-loaf type in *borealis,* and uniquely high backed in cleft-pyramidal *descriptus*. And *borealis* is like *vulgatissimus* in having frequently five cells in the male anal triangle.

For my own aid in this study I prepared a tentative key to the males of the Exilis Group of species based wholly on the structure of the 2nd abdominal segment. I offer it herewith for whatever it may be worth.

Key to Males of Gomphus s. str.

Based on the Genitalia of the Second Abdominal Segment (as inverted, and as seen from the side)

1. Posterior hamule with a shoulder....2
   Posterior hamule without a prominent shoulder ("penguinoids")....8
2. Posterior hamule sway-backed, portion above shoulder long, oblique, and tapered rather abruptly to a point; teeth of anterior hamule inclined upward....*australis*
   Posterior hamule more or less erect, portion above shoulder not so long; teeth of anterior hamule directed inward....3
3. Anterior hamule long, slender, strongly bent and reaching above level of shoulder of the posterior hamule....*cavillaris*
   Anterior hamule stouter, straighter, and not reaching above level of shoulder....4
4. Posterior hamule very broad, narrowed abruptly at its depressed end hook....*graslinellus, oklahomensis*
   Posterior hamule less broad, its neck more tapering and hook less depressed....5
5. Hood of penis brachycephalic (round-headed), its posterior surface warty....*militaris*
   Hood of penis dolicocephalic (long-headed), its posterior surface not warty....6
6. Lashes of penis much shorter than its segment 3....*minutus*
   Lashes of penis a little longer than segment 3....7
7. Anterior hamule with several large teeth....*flavocaudatus*
   Anterior hamule with one large tooth and several other inconspicuous ones....*exilis*
8. Anterior hamule a tenaculum (a long-stalked hook)....9
   Anterior hamule not a tenaculum....10
9. Hood of penis very high, twice as high as wide....*descriptus*
   Hood of penis not so high; wider than high....*quadricolor*
10. Anterior hamule truncated, 4 plus 1 teeth; hood peaked....*borealis*
    Anterior hamule prolonged upward into a hook; hood rounded above...11
11. Anterior hamule with one large tooth....*lividus*
    Anterior hamule with two small subequal teeth..*confraternus* and *kurilis*
    Anterior hamule with four teeth....*spicatus*

Which Species Go Best with Vulgatissimus?

The type species of the original genus *Gomphus, G. vulgatissimus,* seems to have characters in common with all the other species and yet is not in very close agreement with any of them. The first American species to be placed by Selys alongside *vulgatissimus* in his typical Group III was *fraternus*. It is possible that the

name *Gomphus s. str.* might better go with the small Fraternus Group of four species that I have in the foregoing pages placed as a sub-group among the species of *Gomphurus.* Hagen placed the nymphs together in 1885; *vulgatissimus* led his list of nymphs, and was immediately followed by descriptions of two species (his nos. 12 and 13 on pp. 261 and 262) that were of very similar form, that clearly belong in his Vulgatissimus Group. One of these two nymphs that he labelled "G. adelphus supposition" appears in reality to have been *fraternus.* The other has not been reared. The three species are broadly depressed and grooved down the middorsal line of the abdominal segments, where members of the Exilis Group bear elevated dorsal hooks. This should be an important character—a difference in kind, such as generally indicates divergent evolutionary trends.

When we compare the adults of *fraternus* and *vulgatissimus,* we encounter the same kind of difficulties as when comparing *vulgatissimus* with *brevis,* not in venation, but in genitalia of the 2nd abdominal segment. The anterior hamules are near enough alike, but the posteriors are very different; not short and neckless above the shoulder in *fraternus,* but with a long strong freely incurving hook. The hood of the penis is of the cleft-pyramidal type in *fraternus;* split-loaf type in *vulgatissimus.* The fourth joint of the penis has a shorter body and longer lashes in *fraternus.* In respect to the slight angulation of vein A1 below the gaff I have found *fraternus* just as variable as *vulgatissimus.*

The arrangement of species shown in the table on page 315, as I said in the beginning of this article, is still tentative. It awaits further studies of both external and internal parts. I am leaving the grouping of species much as I had it in the *Handbook* of 1929 because of doubts as to which of the American species is most closely allied to *Gomphus vulgatissimus,* and should therefore retain the original generic name *Gomphus.*

The slight differences that I have been enumerating are hard to evaluate. There are none that seem clearly to warrant further generic separation. It is easy to pick out pairs of closely allied species but difficult to arrange the pairs in a harmonious system. There are diversities among our species but they seem to run contrariwise. Further analysis may well wait on comparative studies

with more adequate material. Meanwhile the convenience of the general student will be served by leaving the larger number of species under the old familiar generic name.

It is also to be borne in mind that not all the species of the *Gomphus* Complex, are North American. There is a secondary center of abundance in East Asia. Of the 30 or more known Chinese species, nymphs are known for but two. These two, *Gomphus* (*Gastrogomphus*) *abdominalis* and *G.* (*Xenogomphus*) *agricola,* are both pond species that I reared at Nanking in 1928. These and *G.* (*Eogomphus*) *neglectus* are very different from all our North American species. They were segregated and further characterized by me in my paper of 1944. Some of the other Chinese species do not fit very well into the categories of genera and subgenera herein discussed. Two that were described by me in 1928, *clathratus* and *gideon,* may go in *Stylurus,* and *septimus,* in *Arigomphus,* without too much strain on proposed group boundaries. While I once had before me many borrowed Chinese specimens for study, time did not permit full use of them, and they are no longer available. In the preceding pages I have dealt only with American material. A careful comparative study of all the species of the Complex is needed.

In *Gomphus* we are dealing with a primitive group of dragonflies whose surviving members with few exceptions are localized in distribution, often rare in occurrence and sparingly represented in collections. The nymphs of fewer than half of the species have been described; what the finding of the others will reveal there is no knowing; most likely, intergradation, with further mixing.

The type of the Genus, *Gomphus vulgatissimus,* is such a middle-of-the-road species that for the present I leave it in the middle of a three-way-possible grouping of the 50 American species, with a big question mark alongside it. Three arrows indicate trends apart. I had hoped in beginning this correlated study of wing venation, genitalia and nymphal structures to definitely determine whether the name *Gomphus* should go with the little *hybridus* group or with the little *fraternus* group; or with the larger but less consistent *exilis group;* but for the present, I have chosen to leave it with the *exilis* group, pending further discoveries.

GOMPHUS

Type

G. vulgatissimus L.

brevis	?	fraternus
abbreviatus		externus
parvidens		crassus
viridifrons		hybridus
		adelphus
	↓	
	quadricolor	
descriptus		confraternus
borealis		kurilis
	williamsoni	
lividus		graslinellus
militaris		oklahomensis
	australis	
exilis		spicatus
flavocaudatus		minutus
	cavillaris	
	brimleyi	

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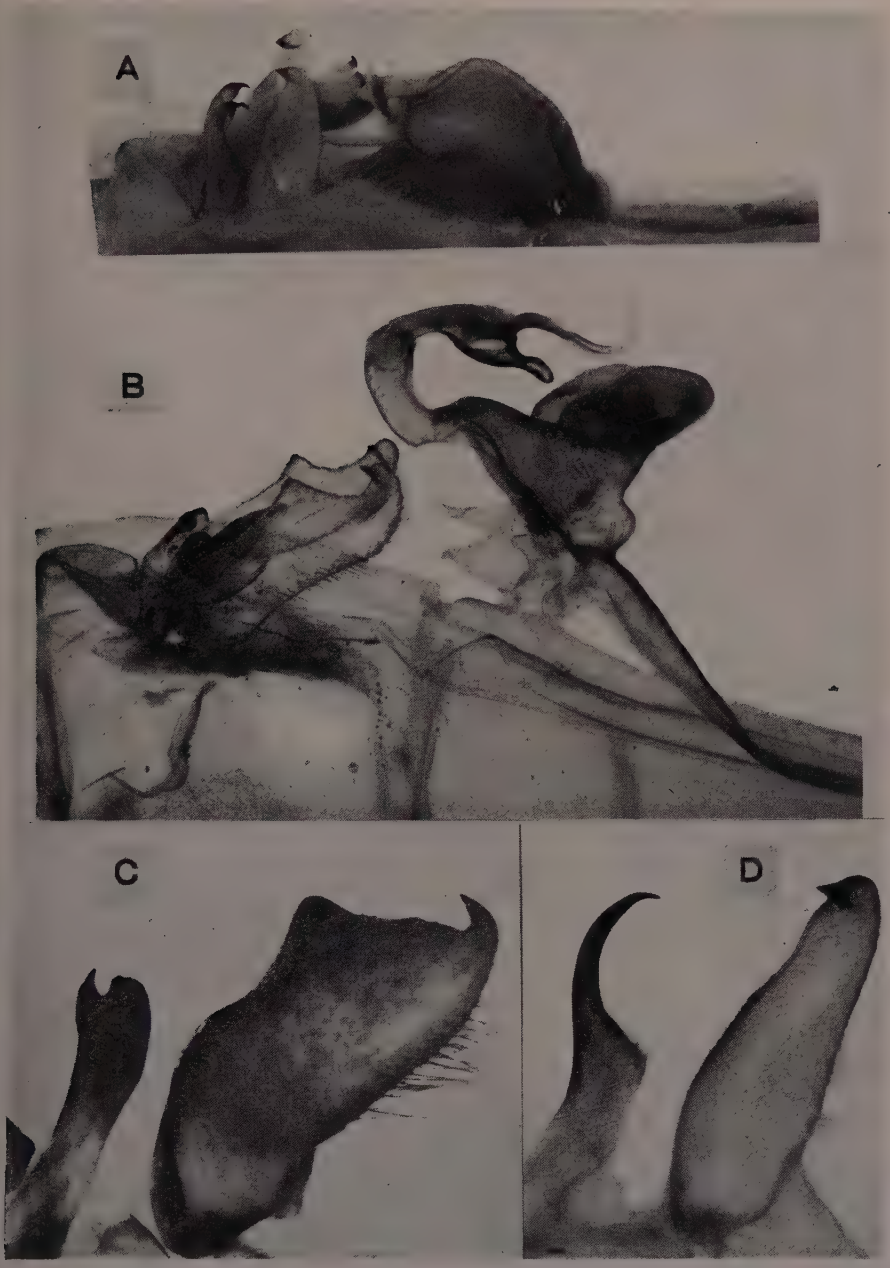

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Explanation of Figures

Plate XV

Male genitalia of *Gomphus* from the ventral side of 2nd and 3d abdominal segments. Photos by M. J. Westfall, Jr., not retouched.

A. *Gomphus lividus;* parts in repose. Reading from left to right the parts are: anterior lamina, anterior hamules, posterior hamules, tip of the third segment of the penis, base of the fourth segment of the penis, and peduncle (vesicle) or basal segment. The peduncle is of the "split loaf" type.

B. *Gomphus brevis;* penis exposed by being torn from its moorings in the genital pocket and lifted on the sternum of the 3d abdominal segment. The tip of the *penis guard* shows by transparency through posterior hamule. The tips of the two long penis tails are lost because of their transparency. The peduncle is of the "cleft pyramidal" type.

C. *Gomphus brevis;* anterior and posterior hamules fully exposed and viewed obliquely from the side.

D. *Gomphus quadricolor;* same as for *G. brevis*. The posterior hamule approaches the "penguinoid" type.

Transactions of the American Entomological Society, Vol. LXXIII.
Pages 307–339 Issued January 9, 1948 1147.85

INDEX TO THE GENERA AND SPECIES

New Genera and Species Are Indicated by Bold Face Numerals

abbreviata, Nostima, 40
aceriella, Epinotia, 97
Acoloithus, 90
adamanicus, Macrocamptus, 255
adelus, Brachycentrus, **165**
Adoneta, 89
adversa, Paralimna, 110
affinis, Olenecamptus, 199
Agapema, 88
Agapetus, 132
agilana, Olethreutes, 94
Agrolimna, 55, 118
albatus, Microlenecamptus, 280
albicomana, Argyrotoxa, 102
albicornis, Cylindrepomus, 271
albidus, Olenecamptus, 185
alboclavata, Notiphila, 59
albolineatus, Olenecamptus, 247
albonotata, Paralimna, 112
albonotatus, Microlenecamptus, 283
albopictus, Cylindrepomus, 269
albovittatus, Olenecamptus, 185
alternatum, Dorcaschema, 287
amithaon, Phanaeus, 304
Amorbia, 100
Anagapetus, 131
Anchylopera, 97
ancudensis, Notiphila, 59
Ancyclis, 98
angulus, Bolboceras, **170**
angustana, Phalonia, 104
aniqua, Neophylax, **153**
anogeissi, Olenecamptus, 193
Aphodius, 169
appendiculata, Paralimna, 54
approximata, Paralimna, **114**
aquilellus, Schoenobius, 91
arabica, Paralimna, 111
archaon, Goera, **156**
Archips, 101
argutanus, Episnus, 92
argyrostoma, Paralimna, 53
Argyrotaenia, 102
Argyrotoxa, 102
Arigomphus, 323
artemis, Olenecamptus, **232**
asperatella, Tetralopha, 91
astyochus, Cylindrepomus, **268**
atlanta, Neophylax, **152**
Atopsyche, 127
atra, Typopsilopa, 60
atropos, Cylindrepomus, **260**
aureolineatus, Cylindrepomus, **276**
auriceps, Ectemnius, 19
australis, Olenecamptus, **217**

Banksiola, 149
basalis, Olenecamptus, 221
battangi, Olenecamptus, 210
bennetti, Micrasema, **160**
bernea, Anagapetus, **131**
biconjunctus, Cylindrepomus, 278
bifila, Rhyacophila, 127
bilineatus, Cylindrepomus, 270
bilobus, Olenecamptus, 224
bimaculata, Hetoemis, **293**
biocellatus, Microlenecamptus, 281
bipartitana, Olethreutes, 94
bipunctata, Notiphila, 120
bistriata, Paralimna, 53
bivittata, Ectypia, 89
blairi, Olenecamptus, 238
blandana, Archips, 101
Bolboceras, 170

bona, Paralimna, 110
borneensis, Olenecamptus, 231
Brachycentrus, 164
brasilliensis, Notiphila, 59
breviornatana, Sparganothis, 100
brimleyi, Podabrus, 70
brunneiceps, Paralimna, 49
burmensis, Olenecamptus, 241

caldwelli, Smicridea, 145
cana, Notiphila, 123
Canarsia, 91
canax, Dicosmoecus, 149
canens, Nostima, 41
caniceps, Ilythea, 44
Cataclysta, 90
Celerio, 88
Ceratomia, 87
Cernotina, 137
chelatus, Brachycentrus, 164
Cheumatopsyche, 140
chinensis, Olenecamptus, 204
cicindeloides, Cylindrepomus, 262
cilifera, Paralimna, 53
cinerea, Hetoemis, 291
circulifer, Olenecamptus, 195
clarus, Olenecamptus, 251
claviventris, Euplilis, 5
Coelostathma, 100
comis, Cylindrepomus, 268
compressipes, Olenecamptus, 242
concinnana, Exartema, 93
confluens, Olenecamptus, 236
Paralimna, 113
congoanus, Olenecamptus, 213
consimilis, Hesperophylax, 152
continuus, Ectemnius, 12
coracina, Harrisina, 90
coruscana, Olethreutes, 94
costalis, Notiphila, 59
costomaculana, Exentera, 96
craesus, Ectemnius, 12
cressoni, Ilythea, 45
cressoniana, Exentera, 96
cretaceus, Olenecamptus, 181
crispana, Thiodia, 94
cubensis, Lestica, 29
curtus, Limnephilus, 152
cyanauges, Ectemnius, 26
cyanellus, Phanaeus, 301
cyaneus, Cylindrepomus, 259
Cylindrecamptus, 284
Cylindrepomus, 256
Cyrnellus, 137

dahli, Olenecamptus, 226
dasycera, Paralimna, 116
daytona, Oecetis, 153
decalda, Hydropsyche, 138
decemmaculatus, Olenecamptus, 204
decipiens, Paralimna, 54
deludana, Gretchena, 97
detzneri, Olenecamptus, 236
Dichrorampha, 98
Dicosmoecus, 149
didius, Olenecamptus, 242
dietrichi, Podabrus, 74
difficilis, Notiphila, 59
difformis, Phanaeus, 302
dimbokro, Olenecamptus, 189
Discocerina, 36
discopunctana, Coelostathma, 100
diteris, Micrasema, 161
Ditrichophora, 36
diversemaculatus, Olenecamptus, 196
dizoster, Ectemnius, 17
dominus, Olenecamptus, 239
Dorcaschema, 285
Dorcaschesis, 293
dorsisignatana, Eucosma, 95
dreisbachi, Podabrus, 73
dubiana, Anchylopera, 98
Dysodia, 90

echo, Oligoplectrum, 164
Ectemnius, 9
Ectypia, 89
eglenensis, Pyrgarctia, 89
electa, Typopsilopa, 123
elegans, Olenecamptus, 189

elegantula, Nostima, **40**
elissoma, Hydropsyche, **137**
Endothenia, 92
enigma, Ptilomyia, 35
Ephippiphora, 99
Epiblema, 95
Epinotia, 97
Epipaschia, 91
Episimus, 92
erigia, Atopsyche, **129**
erythrocera, Notiphila, 57
Euclea, 89
Eucosma, 95
Euplilis, 5
Exartema, 92
Exentera, 96
exotica, Notiphila, 59

fagus, Limnephilus, 152
falsarius, Acoloithus, 90
fasciatana, Exartema, 93
fasciolana, Gypsonoma, 95
fenestralis, Zeros, 45
fervidana, Archips, 101
filiformis, Cylindrepomus, 276
fissus, Podabrus, 72
flavedana, Platynota, 101
flavida, Nostima, **43**
flavipes, Zeros, 45
flavitarsis, Typopsilopa, 60
flavivittana, Peronea, 103
flavocellana, Epiblema, 95
flexineuris, Paralimna, 49
floridanus, Aphodius, **169**
    Phanaeus, 304
foedana, Exartema, 92
formosalis, Nymphula, 90
formosana, Thiodia, 94
formosanus, Olenecamptus, 204
fouqueti, Olenecamptus, 205
fractivergata, Ilythea, 108
fractivittana, Archips, 101
frontalis, Notiphila, 56
frosti, Podabrus, 64
fulicalis, Cataclysta, 90
fulvicosta, Haploa, 89
fulvipes, Paralimna, 116
fulvithorax, Cylindrepomus, 266
fulvoroseana, Sparganothis, 100
fumiferana, Archips, 102
furcata, Notiphila, 56
fusca, Ilythea, 44
fuscociliana, Anchylopera, 97
fuscolineana, Tortrix, 102
fuscostrigana, Phalonia, 103

galbina, Agapema, 88
gallicolana, Peronea, 103
gallivorana, Sparganothis, 101
gelbae, Agapetus, **132**
gilvipes, Nostima, 40
giraffa, Olenecamptus, 190
Glossosoma, 130
Goera, 156
Gomphus, 307, 329
    species of, 315
Gomphurus, 315, 327
    species of, 315
grammicus, Cylindrepomus, 271
Grapholitha, 99
gratiosana, Exartema, 93
grenadinus, Euplilis, **8**
gressitti, Olenecamptus, **234**
Gretchena, 97
grisecens, Cylindrepomus, 278
griseipennis, Olenecamptus, 219
guadalcanalus, Olenecamptus, **244**
Gypsonoma, 95

hamameliella, Episimus, 92
Haploa, 89
harrisii, Lapara, 88
Harrisina, 90
hebridarum, Olenecamptus, 237
hecate, Cylindrepomus, **274**
Hedia, 94
helopalis, Cataclysta, 90
Hesperophylax, 151
Hetoemis, 291
hofmanni, Olenecamptus, 188
hoogstraali, Plectropsyche, **142**
howardi, Psilopoidea, 124

Hulstia, 91
humerosana, Amorbia, 100
Hydrellia, 37, 107
Hydrina, 44
Hydropsyche, 137
Hydroptila, 147
Hypocrabro, 11

igneus, Phanaeus, 304
ignobilis, Notiphila, 120
Ilythea, 44, 108
ilytheoides, Nostima, 42
incanana, Dichrorampha, 98
incertana, Argyrotaenia, 102
incisus, Hesperophylax, 151
indianus, Olenecamptus, **233**
indicus, Olenecamptus, 194
inornatana, Exartema, 92
Pachylia, 88
instrutana, Olethreutes, 94
intacta, Olenecamptus, 183
intensa, Hydrina, 44
intermedius, Zeros, 107
intermistana, Olethreutes, 94
interruptus, Olenecamptus, 187
interstinctana, Grapholitha, 99
intrusus, Podabrus, **67**
invenatus, Zeros, 107
isis, Oedenops, 108

javanicus, Cylindrepomus, 277

kenyaensis, Nostima, 107
Notiphilia, **119**

lacteoguttatus, Olenecamptus, 229
laetus, Cylindrepomus, 266
lamborni, Paralimna, **111**
lamiana, Anchylopera, 97
lanuginosa, Megalopyge, 89
laosus, Olenecamptus, 230
Lapara, 87
laticlavia, Lithacodes, 89
latosa, Hydroptila, **148**
lautana, Sereda, 98
ledus, Cylindrepomus, **270**
leonensis, Olenecamptus, **187**
lepidana, Phalonia, 104
Lestica, 29
leucophaeata, Sphinx, 87
limbata, Paralimna, 115
Limnephilus, 152
lineaticeps, Olenecamptus, 185
lineatus, Cylindrecamptus, 284
Lithacodes, 89
longirostrallus, Schoenobius, 91
lunata, Hydrellia, 107
luscitiosa, Sphinx, 87
lutosana, Argyrotaenia, 102
luzonensis, Olenecamptus, **228**
lyncea, Pachylia, 88
lynx, Paralimna, 111

macari, Olenecamptus, **189**
mackieae, Paralimna, **114**
Macrocamptus, **253**
maculalis, Nymphula, 90
maculidorsana, Peronea, 103
maculosus, Olenecamptus, **208**
madecassus, Olenecamptus, 235
magnificens, Phanaeus, **302**
magnus, Hesperophylax, 151
majada, Atopsyche, **129**
malaccensis, Cylindrepomus, 261
malayensis, Olenecamptus, **249**
malkini, Rhyacophila, **126**
Malthaca, 89
marginalis, Cyrnellus, 137
marginatus, Olenecamptus, 182
marshalli, Cylindrepomus, **274**
mayeri, Ectemnius, 25
mediofasciana, Ancylis, 98
Megalopyge, 89
melaca, Triaenodes, **155**
melco, Neureclipsis, **134**
melinellus, Schoenobius, 90
meridionalis, Paralimna, 49
Merospis, 26
mexicanus, Phanaeus, 304
Micrasema, 159
Microlenecamptus, 279
mindanaensis, Olenecamptus, **228**

minutus, Oligophlebodes, 152
molosus, Paralimna, 52
Moodna, 91
mucronatus, Cylindrepomus, 261
multinotatus, Olenecamptus, 246
multipunctata, Paralimna, 50
mutabilana, Phaecasiophora, 92

natalensis, Olenecamptus, **186**
neiswanderi, Polycentropus, **135**
Neophylax, 152
Neureclipsis, 134
niasus, Olenecamptus, **232**
nidor, Paralimna, 110
niger, Phanaeus, 303
nigripes, Paralimna, 108
nigrofasciatus, Cylindrepomus, 265
nigromaculatus, Olenecamptus, 252
nigropicta, Paralimna, 51
nigrum, Dorcaschema, 289
nimbatana, Hedia, 94
nipponensis, Olenecamptus, **229**
nitida, Hydrina, 44
nitidana, Exartema, 92
nitidifrons, Hydrina, 44
nitidigaster, Nostima, **43**
nitidiventris, Discocerina, 36
nitidula, Xylophanes, 88
niveivenosa, Nostima, 41
niveofasciata, Nostima, **40**
niveoguttata, Ilythea, 44
nogus, Limnephilus, 152
Nostima, 39, 107
Notiphila, 55, 118
nubeculana, Anchylopera, 97
nubifer, Paralimna, 112
nubilana, Endothenia, 92
nubilus, Olenecamptus, 214
nuda, Oedenops, 46
Nymphula, 90

obscura, Paralimna, 54
Zeros, 45
obscuricornis, Notiphila, 118
obscuripes, Hydrellia, 38
obsoletus, Microlenecamptus, 281
occidentalis, Hesperophylax, 151
ocellana, Ancylis, 98
ocellifera, Ptilostomis, 149
ochreana, Eucosma, 95
Ochrotrichia, 146
octomaculatus, Olenecamptus, 239
octopustulatus, Olenecamptus, 203
octovittata, Dorcaschema, 289
oculatana, Dysodia, 90
Oecetis, 153
Oedenops, 46, 108
Olenecamptus, 177
olenus, Olenecamptus, 216
Olethreutes, 94
Oligophlebodes, 152
Oligoplectrum, 164
onisca, Micrasema, **160**
ophionis, Agapetus, **133**
optatoides, Olenecamptus, **202**
optatus, Olenecamptus, 201
oreia, Rhyacophila, **126**
osorno, Hydrellia, 38
ostrinella, Moodna, 91
otiosana, Epiblema, 95
oxybaphi, Celerio, 88
oxypterus, Cylindrepomus, 273

Pachylia, 88
packardiana, Epinotia, 97
paenulata, Euclea, 89
palawanus, Olenecamptus, **206**
Paralimna, 46, 108
parmatana, Ephippiphora, 99
Thiodia, 99
parva, Hydrellia, 38
patrizii, Olenecamptus, 218
pectinata, Paralimna, 51
Pedomoecus, **150**
peregrinus, Cylindrepomus, 263
peritana, Tortrix, 102
perlucidula, Malthaca, 89
permundana, Exartema, 93
Peronea, 103
Phaecasiophora, 92
Phaiosterna, 54, 115
Phalonia, 103

Phanaeus, 300
phenosa, Ochrotrichia, **147**
Philygriola, 42
picana, Polycentropus, **136**
piger, Paralimna, 51
plagosana, Ancylis, 98
planulus, Podabrus, **65**
platanana, Anchylopera, 98
platanella, Tetralopha, 91
Platynota, 101
Plectropsyche, **141**
pleurivittata, Paralimna, 53
plumbiceps, Paralimna, 51
pluto, Phanaeus, 300
Podabrus, 64
pokuma, Notiphila, **121**
polita, Ditrichophora, 36
Polycentropus, 135
Polychrosis, 92
porteri, Oecetis, **154**
portis, Hydrellia, 107
pseudoserratus, Olenecamptus, **233**
pseudostrigosus, Olenecamptus, 240
Psilopoidea, 124
pterna, Glossosoma, **130**
Ptilomyia, 35
Ptilostomis, 149
pulchellana, Anchylopera, 98
pulchra, Nostima, 42
punctatus, Podabrus, 74
puncticollis, Paralimna, 109
puncticornis, Paralimna, 52
pupulata, Paralimna, 113
purpurana, Archips, 102
Pygarctia, 89
pyrifoliana, Spilonota, 94

quadridens, Phanaeus, 301
quadriplagiatus, Olenecamptus, **197**
quietus, Olenecamptus, 220
quinola, Hydroptila, **147**
quinquemaculatus, Olenecamptus, 234

reducta, Olenecamptus, 201
repentinus, Ceratomia, 87
reticulatana, Sparganothis, 100
rhodesianus, Olenecamptus, **215**
Rhyacophila, 126
rotosa, Hydropsyche, **139**
rubervirens, Phanaeus, **301**
rubriceps, Cylindrepomus, 274

Salebria, 91
saliciana, Gypsonoma, 96
salicicolana, Gypsonoma, 96
saligneana, Epiblema, 95
samarensis, Cylindrepomus, **264**
sana, Paralimna, 48
sandacanus, Olenecamptus, 245
santiago, Polycentropus, **136**
sarawakensis, Olenecamptus, 220
schildi, Nostima, 41
Schoenobius, 90
schuhi, Glossosoma, **130**
scintillana, Eucosma, 95
scotti, Micrasema, **159**
scudderiana, Epiblema, 95
secunda, Paralimna, 47
selina, Banksiola, 149
semifasciatus, Ptilostomis, 149
semifuscana, Archips, 102
senegalensis, Olenecamptus, 208
sentana, Platynota, 101
sera, Paralimna, 52
Sereda, 98
sericata, Dorcaschesis, 294
serratus, Olenecamptus, 223
setifemur, Paralimna, 110
sexlineatus, Cylindrepomus, 258
sexplagiatus, Olenecamptus, 193
shelfordi, Cylindrepomus, 267
siamensis, Olenecamptus, 200
Sibine, 89
sierra, Pedomoecus, **151**
signatana, Epinotia, 97
signaticollis, Olenecamptus, 192
signatus, Microlenecamptus, 282
similiana, Eucosma, 95
similis, Olenecamptus, 212
simulana, Dichrorampha, 98
slossonae, Nostima, 42

Smicridea, 144
smithsonianus, Triprocris, 90
somalius, Olenecamptus, **213**
Sparganothis, 100
Sphinx, 87
spilogaster, Nostima, **41**
Spilonota, 94
spinicornis, Hydrellia, 38
spireaefoliana, Anchylopera, 97
spoliana, Exentera, 96
sticta, Paralimna, 53
stimulea, Sibine, 89
striata, Notiphila, 57
striatana, Thiodia, 95
strigosus, Olenecamptus, 243
strucki, Olenecamptus, **225**
Stylurus, 325
    species of, 315
subcaesiella, Salebria, 91
subobliteratus, Olenecamptus, 252
sulfureana, Sparganothis, 100
superatalis, Epipaschia, 91
superbus, Olenecamptus, 184

tagalus, Olenecamptus, 250
taho, Agapetus, **133**
taino, Ectemnius, 22
taiwanus, Olenecamptus, **229**
tardigrada, Euclea, 89
taurus, Paralimna, 48
tedyuscongalis, Nymphula, 90
teres, Notiphila, 59
ternatus, Olenecamptus, **227**
tesellatus, Olenecamptus, 209
Tetralopha, 91
thalassina, Xylophanes, 88
Thiodia, 94, 99
tibialis, Hydrellia, 38
timidella, Epinotia, 97
tonkinus, Olenecamptus, **230**
torrens, Phanaeus, 303
Tortrix, 102
trapoiza, Ochrotrichia, **146**
Triaenodes, 155
triangularis, Phanaeus, 303
triangulifera, Notiphila, 55
trimaculatus, Olenecamptus, **235**
triplagiatus, Olenecamptus, 207
Triprocris, 90
tripunctata, Atopsyche, 128
tristrigana, Grapholitha, 99
truncona, Cernotina, **137**
tusculum, Hydroptila, **148**
Typopsilopa, 60, 123

ulmi-arrosorella, Canarsia, 91
undulatella, Hulstia, 91
unguiculatus, Cylindrepomus, 277
unifasciana, Sparganothis, 100
uniformis, Cylindrepomus, 277
utico, Smicridea, **144**

vansomereni, Paralimna, 114
variana, Epinotia, 97
versicolorana, Exartema, 92
versuta, Pachylia, 88
vesperana, Archips, 101
viburnana, Peronea, 103
vindex, Phanaeus, 301
virescana, Tortrix, 102
virgata, Notiphila, 57
virgatella, Salebria, 91
virgatus, Macrocamptus, 254
virginiana, Exentera, 96
    Sparganothis, 101
viteana, Polychrosis, 92
vittaticollis, Olenecamptus, 196
vittatus, Olenecamptus, 215
voluta, Adoneta, 89
vulgaris, Hydrellia, 38
vulgatissimus, Gomphus, 334

whedoni, Gomphus, **313**
wildii, Dorcaschema, 286
wrighti, Cheumatopsyche, **140**

xanthocera, Hydrellia, 37
Xylophanes, 88

zamboanga, Olenecamptus, **250**
zanzibaricus, Olenecamptus, 211
Zeros, 45, 107
zion, Cheumatopsyche, **141**